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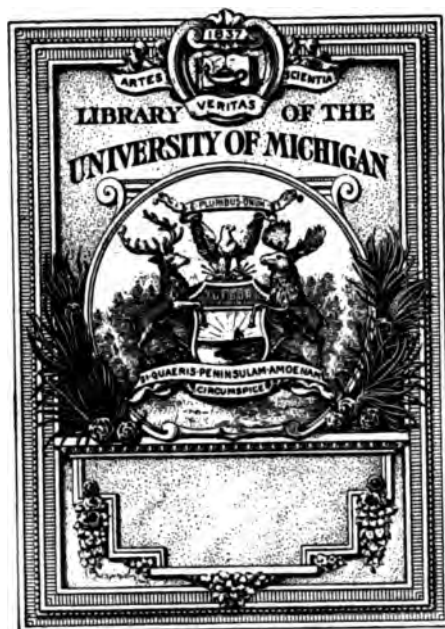
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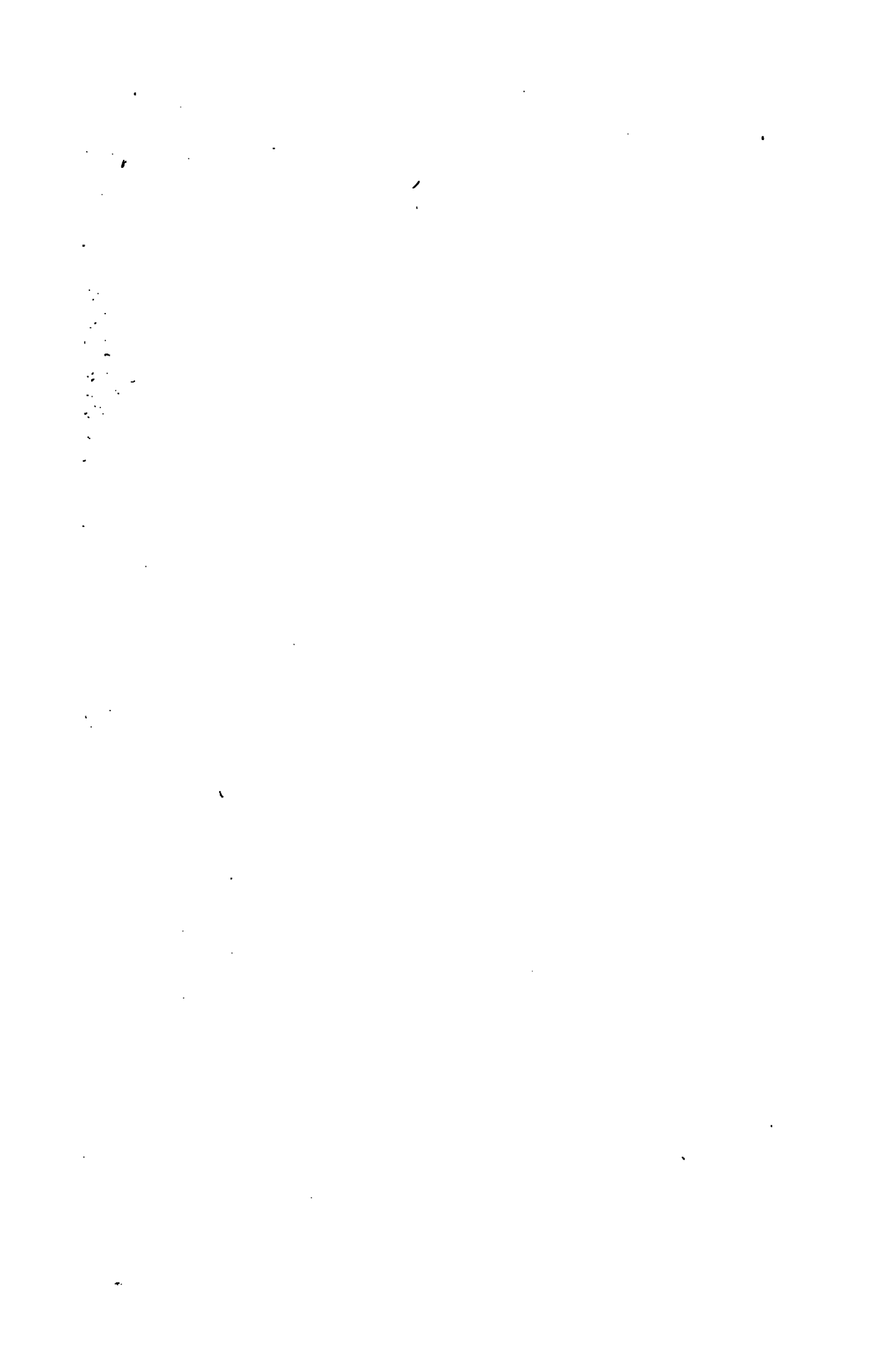
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PROCEEDINGS  
OF THE  
MANCHESTER • INSTITUTE  
OF  
ARTS AND SCIENCES.

VOL. I, 1899.

MANCHESTER, N. H.



PUBLISHED BY THE INSTITUTE.

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MANCHESTER, N. H.  
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1900.



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# MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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## ORGANIZATION AND INCORPORATION.

During the autumn of 1898 the suggestion that there might be a great gain in usefulness and economy of administration, through a combination of organizations having somewhat similar purposes and interests, met with the cordial endorsement of many public-minded citizens, chiefly members of the Manchester Electric Club and the Manchester Art Association. Accordingly a joint committee from those organizations held meetings at various times during the months of November and December, at the residence of Hon. Joseph W. Fellows, at which meetings a plan of organization was formulated.

In the meantime articles of incorporation were drawn up, setting forth the purpose of the signers to form a corporation to be known as the Manchester Institute of Arts and Sciences and defining the objects of the corporation to be, "to promote the cultivation of the arts and sciences, to give a more general impulse and systematic direction to scientific research and encourage and stimulate the study of history, literature and industrial institutions." The articles of association, with a list of the signatures thereto, will be found appended.

The first meeting of the incorporators was held at the rooms of the Manchester Art Association, December 31st, 1898, at 7.30 P. M., the following gentlemen being present: Edward J. Burnham, Joseph W. Fellows, William H. Huse, Luther C. Baldwin, Henri Schaeffer, Norwin S. Bean, Albert L. Clough, Dr. Ezra B.

Aldrich, Arthur J. Smith, Charles J. Abbott, George I. Hopkins, Adna A. Jenkins, Herbert E. Richardson, Edward H. Fogg, J. Brodie Smith, Frederick W. Shontell, Fred W. Lamb, George I. McAllister, Bayard C. Ryder, Harrie M. Young, Frank H. Chellis, Frank C. Livingston, Whiting R. Call.

The meeting was called to order by Joseph W. Fellows, William H. Huse was chosen chairman, and Albert L. Clough made clerk *pro tempore*. The articles of association were ratified and accepted, and a code of by-laws reported by a committee consisting of Joseph W. Fellows, George I. McAllister and Ezra B. Aldrich was adopted.

At an adjourned meeting held January 4th, 1899, the organization was perfected and permanent officers elected. The list of officers chosen will be found appended to the by-laws. The following letter was presented and read :

MANCHESTER, N. H., December 31, 1898.

E. J. BURNHAM, ESQ., MANCHESTER, N. H.

DEAR SIR: The weather is so unfavorable that I shall not attend the meeting to-night of the Manchester Institute of Arts and Sciences. I appreciate the compliment contained in the suggestion that I allow my name to be used as a candidate for the office of President of the Institute. As I think it over, I am persuaded that it is not for the best interest of the Institute that I should hold the office. I fully appreciate the good work you are about to undertake, and as an evidence of my good will I enclose herewith my check for \$100, to be used in fitting up rooms and helping organize the Institute.

Very truly yours,

(Signed)

G. BYRON CHANDLER.

Under these auspices the Manchester Institute of Arts and Sciences had its origin. The story of its subsequent work and influence must be sought in its Journal of Proceedings and in such other publications as may from time to time be issued.

The formal opening of the Institute was signaled by an open public meeting held at its rooms in The Kennard, on the evening of March 22d, 1899, at which Hon. George B. Chandler presided, introducing the Rev. B. W. Lockhart, who delivered the address of the evening.

## ADDRESS

BY THE REV. BURTON W. LOCKHART, D. D.

I extend to you, gentlemen, my most sincere congratulations on the establishment of the Institute of Arts and Sciences which you celebrate this evening. The soul lives in truth and beauty, and your worthy endeavor will be to minister to both, and thus be a "helper to all who would live in the spirit."

The changes of the last four decades are so tremendous that one can hardly realize through what a wonderful era he has been permitted to live. Darwin's *Origin of Species* appeared in 1859. In 1869 there were very few who accepted the new doctrine of evolution by natural selection. But now, says Professor William North Rice, "the fingers of one hand will more than suffice to count the anti-evolutionists who are competent to have an opinion on the subject." Thirty years have sufficed to revolutionize the world of thought on this great question of origins and to place the name of Charles Darwin side by side with that of Isaac Newton, in equal immortality and renown.

During this period Pasteur did his great work, forming the science of Bacteriology. The useful practical results that have come from this are beyond computation. Thus, for example, what lives are saved to-day by antiseptic surgery? What slaughter of babes and invalids avoided by the sterilization of milk and the simple cooking of water?

In 1866 Mr. Field succeeded in laying the great submarine cable. Now these miraculous nerves of thought thrid the labyrinths of all the seas. Then came the telephone, and electric motors and lights; and, just now, we have seen Tesla telegraphing through the ether without a wire. Nor can anybody dream what new births of knowledge and power may be near us in the development of this new agent called electricity.

Great improvements have been made in telescopes. In 1867 the diameter of the largest object glass was eighteen inches. The object glass of the Lick telescope is thirty-six inches. The three

new sciences of Meteorology, Spectroscopic Astronomy and Lithography have taken their places among the older ones.

The law known as the conservation of energy, the indestructibility of what is called force or matter, has been accepted in this period.

There have been many interesting and valuable discoveries in chemistry, one of them, that all gases, including air, are capable of liquefaction under cold and pressure.

Many things, too, have been settled with more or less satisfaction and certainty that had a theological or quasi-theological bearing. Thus, no informed man now limits the age of man on the earth to the old traditional six thousand years. Although the extreme antiquity of man in Lyell's Geology has not been accepted, scientists are agreed that man co-existed with the mammoth and cave bear. Theological opposition to evolution and to science in general is rapidly dying out. Asa Gray, the profoundest philosopher among modern evolutionists, demonstrated that the theory of evolution was not inconsistent with theistic faith, and Prof. James, of Harvard, has shown that the doctrine of immortality is not inconsistent with the facts of physiological psychology.

Churchmen are generally coming to see that a man may be both a convinced evolutionist and a good Christian. The *odium theologicum* is ceasing. Science has fought her fight with superstition and won the victory. There has come a faith that it cannot be injurious to discover and reveal the truth about the universe; that all truth is related and harmonious; consequently that what is true in science will not conflict with what is true in theology, and what is true in theology will not conflict with what is true in science. Among great leaders of science there are few pronounced atheists, and among great theologians few if any deniers of the generally accepted laws and facts of science. Science herself has been the greatest of all irenica. We have come to an age of peace and the echoes of an old controversy are dying.

What can be said of these thirty years from the standpoint of art? I confess that I am unable to speak of this as an expert. But to my thought, if you take art in the sense of the production

of beautiful things, whether literature, painting, sculpture or architecture, we need not fear for our quarter-century. In poetry it has seen the finest work of Tennyson, Browning, Swinburne, Lowell and Longfellow. Ruskin found in it a painter, Turner, worthy of the highest praise. Of course I am not competent to judge, but I should not be surprised if the work of the French and English painters of this epoch should challenge older masters in the race for immortality. Beautiful architecture, art creations, have been witnessed in the great expositions, no less beautiful because they were fragile—like dissolving cloud shapes on the horizon. As I walked through the fairy land of the Chicago exposition the word beautiful was always in my thought, and as I saw the people streaming through, the toilers from distant farms and workshops, I thought that these magnificent palaces, as of wind and cloud, would live in their memories as a beautiful dream forever, a joy, an education, an embodied ideal. Thus, though the epoch we speak of cannot be said to be distinctively artistic, in the same sense that it is distinctively scientific, we can say that it has had famous high priests of art; we can say that beauty has been shed abroad in widest commonalty as at no earlier time. Beauty, we may say, has become democratized by international expositions, by the throwing open of museums of art to the people, by the cheapening of noble literature, and the introduction of fine illustrations through the magazines into common homes. We are realizing today, that it must have been no small part of the education of a citizen of ancient Athens, that every morning he saw the sunlight reflected from the marbles of the Parthenon and glancing from the helm of Pallas Athene.

It is therefore in a time peculiarly fit that you establish your Institute. In a small community like ours we need, for such a work as you propose to do, to enlist all lovers of truth irrespective of religious creeds. Men of faith and men without faith can alike be made welcome here on the common ground of truth that can be proved, and beauty that can be felt and loved. Yes, they can be welcomed in a common faith also, the faith of all thoughtful and sincere men everywhere, that the truth is mighty and will prevail, that the truth is right and ought to prevail.

What, now, is it that you as an Institute of Art and Science can do?

First, you will be a nucleus, a center, toward which will be attracted the people who love science and art. Whether this class of people be large or small they need organization, they need union and they need fellowship. All things, both good and bad, are fostered by union. In this day of clubs and fraternities let us by all means have a fraternity devoted to the study of scientific truth and the production and appreciation of beautiful things. Moreover, people who have a liking for these things may need stimulus; for the cares of the world are with us all and often enough we feel like laying down the weapons of our intellectual warfare because no comrade stands by our side to urge us on. Then it does us good to feel the *esprit de corps* of a society like this, to drink from the fountain of a common inspiration, and hear the bugle blow from time to time from some leader who has gone further and seen more than we. It seems to me that this Institute will be a great help to its members, in the way of sustaining interest in useful studies when for any reason it falters; in furnishing direction, hints as to method, in keeping well informed concerning progress, and in establishing a stable centre for growth.

In the second place you ought to be able to do a good work in counteracting certain tendencies to deterioration which exist in every young civic community like ours. Our city is young, only a little more than a half-century old. There has not been time for culture to make a very deep and rich deposit. Considering our age we need not be discouraged. Perhaps with older cities we compare very favorably; but no spirit of boastfulness should prevent us from seeing where we are weak or from making an effort to strengthen ourselves. An institute of art and science ought to be able to make valuable contributions to that deposit of culture which, next to religion, makes life worth living.

Our city is a centre for manufacture. Its chief interests are industrial. Practically all of our citizens are engaged in making money. The spindles whirr and traffic hums up and down our river. Why not? There is no dishonor in that. There is bread

and meat, there are prosperity and the possibilities of a larger life for all in it. But we must beware of falling too deeply into the current of mere getting and spending. Commerce is good—but commercialism is bad. To devote ourselves wholly to business may at times be as necessary as for a soldier to devote himself wholly to battle. But human nature cannot endure the strain very long without becoming degraded in its finer fibre and vulgarized in soul. Always to be thinking money, always to be hunting it, is what no man can endure without the loss of his intellectual birthright. And only second to commercialism in its narrowing influence is professionalism; the shutting up of our life within the limits of the work by which we earn our bread; the provincialism, the bigotry, the philistinism of the lawyer who is nothing but a lawyer; of the doctor who is nothing but a doctor; of the preacher who is nothing but a preacher; of the banker who is nothing but a banker—of any drudge who is nothing but a drudge. An institute of art and science in a community is a break-water against commercialism and professionalism. The creed you proclaim is that while it is necessary to have knowledge and professional skill which we can turn into cash it is also necessary to have knowledge which we can convert into mental tissue, into intellectual largeness and soundness, into life and life's worthier delights. You will say to the community that truth and beauty are needful to life in a deeper sense than bread and meat; that a mind without curiosity to know the truth of this divine world we live in, and a soul without a hunger for the beautiful, are little nobler than the mechanisms they ply, or "sheep and goats that nourish a blind life within the brain." The real value of life you will say is not measured by what it lays up in our safes but by what we lay up in mind, heart and spirit.

We live in a time when large numbers of men have ceased to be interested in churches and the religious life; not so much because they are devoting themselves to vicious things, as because they are unable to believe what the churches teach, or what they suppose it teaches. They are

"Wandering between two worlds, one dead,  
The other powerless to be born."

This is not a comfortable situation for a man morally earnest and sincere. He cannot, or thinks he cannot, be at home in the church. At the same time he has no interest in any society which lives in denial, which preaches a negative philosophy, often enough in a crude and blatant way. He feels the needs of the inward life, the need of an ideal and of fellowship in an ideal. It occurs to me that your society might be a help to such a man. For supposing he has lost God, lost faith in a future life, there still remain three verities for him to follow—the truths and laws of science, the beauty of the world, and the moral law he finds within him, whose voice remains authentic and imperative amidst the ruins of religious faith. If he follow these he is following gleams of light which are no will-o-the-wisp, but celestial torches which will light the way to the great sun. Indeed I do not see how a genuine institute of art and science can fail to teach religion in an indirect way. To know how to love truth for its own sake is religion, and what is religion but the completest synthesis of beauty and truth, in its transcendent source, God; and our perception that the synthesis is both a necessity of thought and heart. Something like this perception I think must have been in the soul of Keats when he wrote,

"Beauty is truth, truth beauty, that is all  
Ye know on earth and all ye need to know."

THE MANCHESTER INSTITUTE  
OF  
ARTS AND SCIENCES.

---

ARTICLES OF ASSOCIATION.

The subscribers being residents of New Hampshire and twenty-one years of age associate themselves together by these articles of agreement to form a corporation under and by authority of Chapter 147 of the Public Statutes of New Hampshire for the following purposes :

The name of this corporation is THE MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

The objects for which the corporation is established are to promote the cultivation of the arts and sciences, to give a more general impulse and systematic direction to scientific research and encourage and stimulate the study of history, literature and industrial institutions.

The control and management of the affairs of the corporation shall be vested in a Council, which shall be constituted and elected as provided in the by-laws of the association and shall have all the powers of the corporation.

Membership and the rules and regulations for the government of the association and management of its affairs shall be provided for in the by-laws of the corporation, which may be ordained, established or amended by the association at any meeting duly notified.

The corporation shall have power to acquire by purchase, lease or otherwise, real, personal or mixed estate to such an amount as its purposes may require and it may sell and dispose of the same in such manner and at such time as shall be deemed expedient.

The first meeting for the purpose of organization shall be held at the rooms of the Manchester Art Association, No. 913 Elm street, in Manchester, New Hampshire, on the thirty-first day of December, 1898.

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STATE OF NEW HAMPSHIRE.  
OFFICE OF SECRETARY OF STATE.

Received and recorded in Records Voluntary Corporations, Volume 10, pages 228 and 229-30, at Concord, this 30th day of December, 1898.

[ L. S. ]

SAML. H. STEARNS,  
*Deputy Secretary of State.*

CITY CLERK'S OFFICE,  
MANCHESTER, N. H.

Received December 29, 1898, and recorded in Book of Records of Voluntary  
Corporations of said city, Book Vol. 4, Pages 191-192. By me,  
[L. S.]

EDWARD C. SMITH,  
*City Clerk.*

## ROLL OF CHARTER MEMBERS.

Edward J. Burnham,	W. T. Nichols,
Joseph W. Fellows,	John C. French,
Wm. H. Huse,	Wm. C. Clarke,
Luther C. Baldwin,	Fred W. Lamb,
Henri Schaeffer,	Nathan P. Kidder,
Edwin T. Richardson,	Gordon Woodbury,
Norwin S. Bean,	George I. McAllister,
Albert L. Clough,	Lyman W. Colby,
Ezra B. Aldrich,	Josiah Carpenter,
Arthur J. Smith,	Edgar J. Knowlton,
Charles J. Abbott,	Bayard C. Ryder,
E. M. Bryant,	David Cross,
G. I. Hopkins,	Harrie M. Young,
Adna A. Jenkins,	John M. Chandler,
Louis B. White,	Frank H. Challis,
Herbert E. Richardson,	Walter G. Africa,
Frederick W. Batchelder,	Frank C. Livingston,
Edward H. Fogg,	George Byron Chandler,
H. B. Metcalf,	Joel Daniels,
J. Brodie Smith,	Wm. E. Buck,
F. W. Shontell,	W. R. Call.

## BY-LAWS OF THE

### Manchester Institute of Arts and Sciences.

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#### OFFICERS.

The officers of this corporation shall be a President, Vice Presidents, (the number of which to be determined by provisions hereinafter made) a Treasurer, a Clerk, a Corresponding Secretary, a Curator, and a Council constituted as hereinafter provided, all of whom shall be elected annually and hold their offices respectively for one year and until their successors are elected and qualified.

#### DUTIES.

*President.* The President shall preside at all meetings of the association and discharge the usual duties of that office. He shall be the executive officer of the corporation and also be the presiding officer of the Council.

*Vice Presidents.* In the absence of the President a Vice President shall preside in his stead and discharge all the duties of the office, excepting that he shall not be the executive officer of the corporation.

*Treasurer.* The Treasurer shall discharge all of the usual duties of that office and shall give bond for the faithful performance of his duty, in such amount with sufficient sureties as shall be determined by the Council. He shall have custody of the seal of the corporation and shall render a report, suitably audited, of the financial condition of the association at the time of the annual meeting.

*Clerk.* The Clerk shall perform all of the usual duties pertaining to his office and such other duties as may be required from time to time by the Council, and shall be sworn to the faithful performance of his duties. He shall also be clerk of the Council.

*Corresponding Secretary.* The Corresponding Secretary shall discharge all the duties customary to his office, shall conduct correspondence with other associations and persons alike interested, shall have the care and custody of the documents, books and papers not connected with or incident to the records and papers not properly belonging to the office of the Clerk, and he shall perform all such other duties as the Council may require.

*Curator.* The Curator shall have the care and custody of the library, cabinet, art gallery and other property of the Institute, and perform such other duties as may be required by the Council.

*Council.* The Council shall consist of not less than seven members, and the number required for such membership, in addition to President, Clerk, Corresponding Secretary, Treasurer, Curator, and Vice Presidents as hereinafter provided, shall be elected annually by the corporation. The Council shall have the power to appoint all necessary committees.

#### MEMBERSHIP.

Any association, club or organization may become a member of this corporation, with the approval of the Council, by filing with the Clerk an application stating the name and purpose of such organization, with a request to be admitted as a member, and the payment of one dollar. Such membership, when obtained, shall make by the operation of this by-law all of the members of said association, club or organization members of this corporation upon subscribing to the by-laws.

Any person may be elected to membership by the Council upon being recommended by two members, paying the Treasurer the sum of one dollar and subscribing to the by-laws. All applications for membership should designate the section or sections with which the applicant will unite.

Any person may be elected a corresponding member of the Institute by a unanimous vote of the Council, and such member shall be exempt from the payment of dues and membership fee. Any person who shall pay to the Institute the sum of one hundred dollars at any one time shall, on his request, be elected a life member, and as such shall be exempt from all further dues and assessments.

## SECTIONS.

Any association, club or organization, admitted to membership as hereinbefore provided, may become a section, which shall be designated alphabetically by the Council, and have authority to establish its title, to maintain its autonomy and manage its affairs, not inconsistent with these by-laws.

Each section shall have a chairman who shall discharge all of the duties pertaining to such office and ex-officio be and become a Vice President of the association and a member of its Council. Such chairman shall be elected by the section at or before the time of the annual meeting of the association and his election shall be certified by the Secretary of the section to the Clerk of the corporation.

Five or more members may organize a section, with the approval of the Council.

## MEETINGS.

The annual meeting of the corporation shall be held upon the first Wednesday of January, at such hour and place as the Clerk shall deem expedient. Special meetings may be held at such time and place as the Council shall deem expedient. Notice of all meetings shall be given by publication in some newspaper in the city of Manchester by one publication at least ten days prior to said meeting or by written or printed notice by mail to the last known address of each member at least ten days prior to the meeting.

## DUES.

The annual dues shall be three dollars, payable in advance. New members shall be charged for whole months or fraction thereof to the time of the next annual meeting. Any person who fails to pay such dues for one year shall cease to be a member, and his or her name may be stricken from the roll by vote of the Council, after notice by the Clerk of the corporation setting forth such delinquency and the provision of this by-law, and any member may be removed by the Council for cause upon charges after due notice and hearing.

## QUORUM.

At any meeting of the corporation ten members shall constitute a quorum.

## AMENDMENTS.

These by-laws may be altered or amended at any meeting of the association, notice having been given of the proposed change.

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OFFICERS

OF THE

MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

1899.

ALBERT L. CLOUGH, *President.*EDWARD J. BURNHAM, *Corresponding Secretary.*NORWIN S. BEAN, *Treasurer.*HARRIE M. YOUNG, *Clerk.*GEORGE I. HOPKINS, *Curator.*

## COUNCIL.

ALBERT L. CLOUGH,  
EDWARD J. BURNHAM,  
NORWIN S. BEAN,  
HARRIE M. YOUNG,  
GEORGE I. HOPKINS,  
HON. G. BYRON CHANDLER,  
HON. WILLIAM C. CLARKE,  
JOHN C. FRENCH,

CHARLES J. ABBOTT,  
J. BRODIE SMITH,  
WILLIAM K. ROBBINS,  
LUTHER C. BALDWIN,  
WILLIAM H. HUSE,  
MRS. ALBERT O. BROWN,  
MRS. FRED'K W. BATCHELDER,  
GEORGE WINCH.

## ROLL OF MEMBERS.

JAN. 1st, 1900.

Abbott, Charles J.  
Abbott, Florence L.  
Abbott, Maude C.  
Abbott, Walter S.  
Adams, Charlotte R.  
Africa, Walter G.  
Aldrich, Dr. E. B.  
Aldrich, Mrs. E. B.  
Andrews, Frank E.

Balch, Mrs. Chas. E.  
Baldwin, E. T.  
Baldwin, Mrs. E. W.  
Baldwin, Luther C.  
Baldwin, Mrs. L. C.  
Bancroft, Clarence  
Barker, Miss Ella F.  
Barlow, Burton  
Barnes, Miss Mary F.  
Barney, Hial  
Bartlett, Hon. Chas. H.  
Batchelder, Fred'k W.  
Batchelder, Mrs. F. W.  
Batchelder, Miss Kate E.  
Bean, Norwin S.  
Beebe, C. E.  
Bickford, Chas. W.  
Bickford, Mrs. Emma S.  
Bisco, George  
Blodgett, Warren C.  
Blodgett, Mrs. Warren C.  
Bourne, Mrs. Harriet K.  
Bourne, Henry D.  
Bourne, Miss Meta  
Bourne, Stephen N.  
Boutwell, Mrs. Mary S.  
Bower, Fred B.  
Branch, Oliver E.  
Branch, Mrs. Sarah C.  
Broderick, James A.  
Brooks, Miss Gertrude H.  
Brown, Mrs. Abby S.  
Brown, Mrs. S. C.

Brown, Dr. James S.  
Brown, Mary E.  
Bryant, E. M.  
Buck, Wm. E.  
Bullock, Dr. Lillian G.  
Burbank, Wm. E.  
Burnham, Miss Bessie I.  
Burnham, Edward J.  
Burnham, Mrs. E. J.  
Burnham, George E.  
Burnham, Henry E.  
Burnham, Miss Ursula M.  
Butman, Mrs. Jennie C.  
Byrne, Miss Edith N.

Call, W. R.  
Carpenter, Frank P.  
Carpenter, Mrs. F. P.  
Carpenter, Josiah  
Carpenter, Mrs. Josiah  
Castor, Mrs. Edgar E.  
Caswell, Fred M.  
Challis, Frank H.  
Chandler, Mrs. Fanny M.  
Chandler, Geo. Byron  
Chandler, Geo. H.  
Chandler, Henry  
Chandler, John M.  
Chase, C. Edwin  
Cheney, Miss Georgia M.  
Cheney, Mrs. Harriet J.  
Christophe, Sebastian  
Christophe, Mrs. S.  
Clapp, Allen N.  
Clapp, Horace T.  
Clarke, Wm. C.  
Clement, Miss Mary A.  
Cleworth, John  
Cleworth, Mrs. John  
Clough, Albert L.  
Clough, Mrs. L. B.  
Clough, Miss Nora B.  
Coaker, Mrs. Elizabeth M.

- Colby, Lyman W.  
 Collins, Mrs. E. H.  
 Connor, Miss Ellen E.  
 Corey, William  
 Cottrell, Benj. S.  
 Crafts, George P.  
 Crafts, Mrs. G. P.  
 Cross, David  
 Cross, Mrs. David  
 Crowell, Miss Mary E.  
 Currier, Dr. Edward H.  
 Currier, Mrs. Emma F.  
 Currier, Edward S.  
 Currier, Mrs. Moody,  
 Custer, Miss Anna  
  
 Dana, Miss Mary F.  
 Daniels, Miss Belle R.  
 Davis, Miss Edith H.  
 Davis, George M.  
 Davis, Mrs. G. M.  
 Davis, Miss May W.  
 Derby, Miss Lizzie M.  
 Dickey, Miss Esther M.  
 Dole, A. W.  
 Dow, Miss Sarah E.  
 Dowd, Mrs. Mary H.  
 Dowst, Miss Ella M.  
 Dowst, John  
 Drew, Mrs. Annette H.  
 Dustin, Charles R.  
  
 Eames, Wm. M.  
 Edgerly, Clarence M.  
 Ela, Miss Emma J.  
 Elliott, Mrs. Medora W.  
 Elliott Wm. H.  
 Elliott, Mrs. Wm. H.  
  
 Fairbanks, Miss Elsie D.  
 Farmer, Mrs. Lucinda L.  
 Farrell, L. J.  
 Felch, Miss Sadie C.  
 Fellows, Joseph W.  
 Fellows, Mrs. J. W.  
 Ferrin, A. W.  
 Ferren, Eben  
 Ferren, Miss Kittie J.  
 Fogg, Edward H.  
 Fogg, Miss Susy C.  
  
 Foster, Mrs. John  
 French, Charles H.  
 French, Mrs. Emma B.  
 French, John C.  
 French, Dr. L. Melville  
 French, Mrs. Mary E.  
  
 Gage, Miss Mary J.  
 Gault, John  
 Gay, Miss Annie M.  
 George, Miss Ethel L.  
 Gillan, Miss Jean  
 Gooden, Miss Kate M.  
 Gorrell, Mrs. M. M.  
 Graupner, Miss Amelia L.  
 Graupner, Miss Hulda C.  
  
 Hale, Arthur H.  
 Hartshorn, Fred G.  
 Hartshorn, Mrs. Minnie L.  
 Hassam, R. H.  
 Hawkes, Miss M. Clara  
 Hayes, Charles C.  
 Head, Miss Caroline E.  
 Heald, Frank E.  
 Heard, Arthur M.  
 Herrick, Henry W.  
 Hicken, Miss Blanche E.  
 Hoit, Miss Carrie E.  
 Holt, Miss E. Blanche  
 Hope, Miss Ella  
 Hope, Miss Lucy Maud  
 Hopkins, George I.  
 Hoyt, Wm. J.  
 Hubbard, Miss Martha W.  
 Hunt, Mrs. N. P.  
 Hunt, Miss Sara  
 Huse, Mrs. Isaac  
 Huse, Wm. H.  
 Huse, Mrs. Wm. H.  
  
 Jackson, George R.  
 Jenkins, A. A.  
  
 Kemp, Miss Bertha L.  
 Kendall, Willis B.  
 Knowlton, Mrs. Maude Briggs  
  
 Lamprey, Miss Alice M.  
 Lane, Thos. W.

Littlefield, Miss Minnie E.  
 Livingston, Frank C.  
 Lockhart, Mrs. Frances U.

Mack, Miss Isabella G.  
 MacLeod, Mrs. Alberta A.  
 MacLeod, Donald  
 Manning, Charles H.  
 Manning, Robert L.  
 Martin, Frank E.  
 Martin, Miss Winona M.  
 Marshall, Miss Alice  
 McAllister, Geo. I.  
 McAllister, Mrs. Mattie H.  
 McDuffie, Charles H.  
 McDuffie, Mrs. Laura B.  
 McKean, Mrs. Ellen E.  
 McLaren, Miss Emma L.  
 McLaren, H. N.  
 McLaren, Miss Mary E.  
 Means, Mrs. Elizabeth A.  
 Merrill, Albert  
 Mitchell, Miss Mary W.  
 Mooar, Linda Hunter  
 Moore, Wm. E.  
 Morse, Henry H.  
 Morse, Mrs. L. L.  
 Morse, Miss Millicent S.  
 Morse, Dr. M. V. B.  
 Moulton, Miss Mary E.  
 Murkland, Wm. E.

Nichols, Wm. T.  
 Nutt, Miss May F.  
 Nutting, Fred S.

Olzendam, Mrs. A. P.  
 Ormsby, R. S.

Parker, Miss Nellie C.  
 Parker, Walter M.  
 Parker, Mrs. W. M.  
 Patten, Miss Annie W.  
 Peaslee, Robert J.  
 Perkins, David W.  
 Phillips, Miss Grace A.  
 Phinney, George H.  
 Piper, F. S.  
 Price, Mrs. S. E.

Priest, Miss Electa M.  
 Priest, Mrs. Lucia M.  
 Reed, Miss Helen  
 Richardson, Charles L.  
 Richardson, Edwin P.  
 Richardson, Mrs. Harriet B.  
 Richardson, Herbert E.  
 Richardson, James M.  
 Richardson, Miss Theodora  
 Richardson, Miss Susan A.  
 Riddle, Pearly H.  
 Robbins, Mrs. Ellen R.  
 Robbins, Wm. K.  
 Robinson, Ed. R.  
 Robinson, Dr. J. Franklin  
 Rowe, Miss Olive A.  
 Ryder, Bayard C.

Sanborn, A. H.  
 Sargent, Herbert G.  
 Sawyer, Miss Frances Fay  
 Schaeffer, Henri  
 Shontell, Fred W.  
 Simmons, Mrs. E. M.  
 Simmons, Walter W.  
 Slayton, Edward M.  
 Smith, Mrs. A. D.  
 Smith, Arthur J.  
 Smith, Dante  
 Smith, J. Brodie  
 Smith, Leonard G.  
 Smith, Miss May L.  
 Smith, Miss Nellie M.  
 Snow, Miss Nellie W.  
 Spaulding, F. L. V.  
 Squire, Miss H. L.  
 Stanton, Miss Theresa B.  
 Staples, Rev. Chas. J.  
 Staples, Mrs. Grace D.  
 Stark, Augustus H.  
 Stark, Mrs. A. H.  
 Stearns, H. A.  
 Stevens, Victor E.  
 Stockbridge, Dana W.  
 Straw, Herman F.  
 Straw, Mrs. H. F.  
 Stuart, Miss Alice M.  
 Taintor, Chas. W.

Thompson, A. W.	Whitten, John H.
Tolman, Miss Mary M.	Whitten, Mrs. John H.
Topliff, Miss Ellen A.	Wiggin, Miss Ellen F.
Tuson, Miss Eva F.	Willand, Miss Alta C.
Tuttle, Miss Hattie S.	Willand, Miss Hattie O.
	Williams, Miss Bertha M.
Varick, John B.	Williams, J. Arthur
Varick, Mrs. John B.	Williams, Mrs. J. Arthur
Varick, Mrs. Thos. R.	Wilson, Miss Ida Belle
Varick, Dr. W. R.	Wilson, R. W.
Varney, David B.	Winch, George
Varney, Miss Emma L.	Wing, Miss Caroline E.
Varney, Mrs. Harriet	Woodbury, Gordon
	Woodman, Miss Susie G.
Walker, Miss Flora M.	
White, Louis B.	Young, Harrie M.
White, William L.	Young, Miss Jennie

## CORRESPONDING MEMBERS.

Edwin A. Jones, Orlando, Fla.      Miss Sarah E. Parker, Pembroke, N. H.

ZOOLOGICAL AGENT—George E. Burnham.

AGENT—Sherburne Fowler, Pembroke, N. H.

CUSTODIAN AND LIBRARIAN—George E. Burnham

## THE MANCHESTER ELECTRIC CLUB.

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On the evening of June 3d, 1892, a number of gentlemen interested in the electrical industry met at the rooms of the Manchester Board of Trade, with the idea in mind of forming an association to be known as The Manchester Electric Club.

This meeting was followed by another on June 7th, at which time the organization of the Club was perfected and its officers for the first year were elected.

The first regular meeting was held June 22d, 1892, at which time it was decided that the Club should have permanent quarters. Rooms were secured in Opera Block, Hanover street, and held by the Club until September 5th, 1894, on which evening the Club opened its new quarters in the Kennard building.

The Club gradually outgrew its quarters in The Kennard, and at the meeting of March 2d, 1898, it was decided to accept an offer made by the Manchester Art Association, that the Club occupy a part of their rooms in the Pickering building. The first meeting in the new rooms was held on Monday evening, April 11th, 1898, and the remainder of the life of the Club was passed in these quarters.

On Monday evening, January 9th, 1899, it was voted to join the Manchester Institute of Arts and Sciences.

The following list of subjects were discussed before the Club at its regular and special meetings, from June 22d, 1892, to January 9th, 1899:

1892.

June 22d, The First Principles of Electricity. Mr. G. I. Hopkins.

July 19th, Practical Talk on Electricity. Mr. G. I. Hopkins.

November 15th, Construction and Use of the Searchlight. Mr. Mark Lowd.

1893.

May 2d, Construction of the Dynamo Machine. Mr. Albert L. Clough.

June 2d, Scientific Methods. Mr. W. K. Robbins.

July 18th, Electrical Features at the World's Fair. Mr. Albert L. Clough.

December 19th, My Connection with the Telephone Business. Mr. W. H. Fairchild.

1894.

January 3d, Telephone Instruments. Mr. J. Brodie Smith.

January 24th, Principles of the Storage Battery. Mr. Albert L. Clough.

April 4th, The Relation of Electricity to Chemistry. Mr. Albert L. Clough.

April 18th, Illustrated Lecture. Mr. Clarence Bancroft.

May 2d, The Printing Telegraph. Mr. J. E. Wilson.

May 16th, The Telephone. Mr. J. Brodie Smith.

June 6th, Elementary Principles of Light. Rev. H. E. Cooke.

June 20th, A Manchester Orchid. Mr. E. J. Burnham.

July 11th. At this meeting Mr. E. J. Burnham spoke in favor of enlarging the scope of the Club, so that such sciences as botany, mineralogy, etc., might be discussed at the meetings, and thought that it would be an inducement for people interested in those sciences to join the Club. At this meeting it was decided to have the Club incorporated as a voluntary, non-dividend paying corporation.

October 31st, The Graphophone. Mr. A. J. P. McClure, of Philadelphia.

November 21st, The Nourishment of Living Organisms from a Scientific Point of View. Mr. W. K. Robbins.

December 19th, Instruments for Measuring Electricity. Mr. Albert L. Clough,

1895.

January 2d, The Human Eye. Dr. H. D. W. Carville.

March 6, Construction of the Piano. Mr. A. A. Jenkins.

June 5th, The Pollenation of Flowers. Mr. E. J. Burnham.  
September 18th, Acetylene Gas. Mr. Albert L. Clough.  
October 2d, The Honey Bee. Mr. Wm. H. Huse.

## 1896.

January 15th, The Norse City of Norembega. Mr. E. J. Burnham.  
March 25th, Static Electricity. Mr. G. I. Hopkins.  
April 15th, Coal Tar Colors. Mr. Henri Schaeffer.  
October 7th, The X-Ray. Messrs. Albert L. Clough and Mr. A. W. Ferrin.  
November 11th, Early American Workers in Scientific Fields.  
Mr. E. J. Burnham.

## 1897.

January 6th, Antiseptics. Mr. W. K. Robbins.  
March 17th, Central Station Equipment and Management. Mr. F. H. Smith.  
April 7th, Experiments with various Explosive Substances. Mr. Louis B. White.  
November 17th, Our Insect Friends. Mr. Wm. H. Huse.  
December 29th, Sun Spots and their Phenomena. Mr. G. I. Hopkins.

## 1898.

March 2d, World Building. Mr. E. P. Richardson.  
April 11th, A Mediterranean Trip. Mr. Norwin S. Bean.

September 12th. Mr. E. J. Burnham gave an interesting and instructive talk on scientific study, pointing out the relationships of the various branches of science and their dependence on each other. The speaker dwelt at some length upon the field of usefulness open to the Club and urged upon the members the benefits to science, and to the city, which might come with the broadening of the Club's field of work. From a modest beginning along limited lines in electricity the organization had broadened its scope until its proceedings had comprehended many other branches of science, and it has become in fact, if not in name, the scientific society of Manchester.

September 26th, The Exposure of Mrs. Huston, Spirit Medium.  
Mr. Wm. H. Huse.

October 10th, The Chemistry of Food. Mr. W. K. Robbins.

October 24th, Psychic Facts. Mr. G. I. Hopkins.

November 28th, Kinetoscope Exhibition. Mr. J. Brodie Smith.

December 12th, The Attitude of the Scientific Mind. Mr. W. E. Moore.

December 27th. At this meeting Mr. J. W. Fellows was authorized to take the necessary legal steps looking toward the formation of the Manchester Institute of Arts and Sciences.

1899.

January 9th. At this meeting it was voted to join the Manchester Institute, the Club to be thenceforth known as —

## SECTION A—Physical Science.

### MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

The following subjects have been introduced and discussed during the year 1899:

January 23d, Experiments with Liquefied Air. Mr. W. K. Robbins and Albert L. Clough.

March 13th, The Weather. Mr. W. H. Huse.

March 23d, An Electrolytic Induction Coil Break. Mr. Albert L. Clough.

April 11th, A Lesson in a Looking-Glass—a Study in the Fourth Dimension. Mr. W. E. Moore.

April 24th, Travels in Cuba. Mr. Norwin S. Bean.

June 12th, Demonstration of the Nernst Light. Mr. Albert L. Clough.

October 23d, The Leonids. Mr. G. I. Hopkins.

November 27th, The Beet Sugar Industry. Mr. W. K. Robbins.

December 18th, Some Delusions of the Nineteenth Century. Dr. James S. Brown.

December 30th, Demonstration of the Rotation of the Earth by means of Foucault's Experiment. E. J. Burnham and Albert L. Clough.

## OUTINGS.

The Club has conducted several field meetings, for the purpose of botanical, entomological and geological study. Among the points visited were the Uncanoonucks, Lake Massabesic, the Devil's Den, Kelley's Falls and Rock Rimmon.

The following public lectures have been given under the management of the Manchester Electric Club :

June 29th, 1894. The Future Developments of Electricity, its Present Limitations and Obvious Possibilities.

PROF. AMOS E. DOLBEAR, Tufts College.

February 6th, 1895. The Measurement of Electricity and Early Experiences in Electrical Engineering.

MR. CARYL D. HASKINS, Boston.

December 9th, 1896. Hawaii.

PROF. GEO. H. BARTON, Massachusetts Institute of Technology.

February 10th, 1897. Bacteriology and its Relation to Public Health.

PROF. WILLIAM T. SEDGWICK.

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OFFICERS OF SECTION A--1899.

WILLIAM H. HUSE, *President.*

CHARLES J. ABBOTT, *Vice President.*

EDWARD J. BURNHAM, *Treasurer.*

ARTHUR J. SMITH, *Recording Secretary.*

FREDERICK W. SHONTELL, *Financial Secretary.*

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EXECUTIVE COMMITTEE.

ALBERT L. CLOUGH, HENRI SCHIAEFFER,

LUTHER C. BALDWIN.



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MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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**SECTION B.**  
**ENTOMOLOGY.**

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**OFFICERS FOR 1899.**

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EDWARD J. BURNHAM, *President.*  
WALTER S. ABBOTT, *Vice President.*  
MISS SUSY C. FOGG, *Secretary.*  
HERBERT E. RICHARDSON, *Treasurer.*

**EXECUTIVE COMMITTEE.**

WALTER S. ABBOTT,      MISS MAY W. DAVIS,  
GEORGE E. BURNHAM.

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# PRELIMINARY CATALOGUE

OF THE

## ANISOPTERA

IN THE VICINITY OF MANCHESTER, N. H.

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BY EDWARD J. BURNHAM.

There is reason to believe that the Odonate type is slowly passing away. Representative of an ancient form of insect life, the Dragon-flies find themselves lacking in adaptability to change of environment. With many of our more recent forms change means development; with the Odonata change is extermination. *Doryphora decemlineata*, after feeding for centuries upon *Solanum rostratum* in its home at the base of the Rocky Mountains, met the outposts of civilization about the year 1859 and reached the Atlantic coast in 1874, having in the brief space of fifteen years spread over the intervening territory. *Pieris rapæ*, introduced from Europe, was first observed in Canada in 1860; by 1886 it had spread over a great part of the North American continent, certainly southward to Florida and westward to Colorado. The Odonata do not possess this power of adaptation to changed conditions. A few species, notably *Libellula quadrimaculata*, have been observed to migrate in large swarms; but these migrations were apparently undertaken in search of food rather than for the purpose of oviposition. As a rule, Dragon-flies are non-migratory.

Few groups of insect life so strikingly illustrate Darwin's observation that closely allied species cannot obtain in the same locality, since of two species attempting to occupy the same situation and feeding upon similar food one must possess in some respect a slight advantage, which will inevitably result in the extermination of the weaker species. The extent to which this principle has been carried among Dragon-flies constitutes one of the most interesting features of a careful study of the Odonata in any

given locality. In the collection of the Manchester Institute of Arts and Sciences the Anisoptera alone comprise 28 species, distributed among 16 genera and 4 sub-families. The specimens were gathered within the radius of an easy walk from the city, and it is certain that were the radius extended to twenty miles the result would be the addition of several genera—and probably of one sub-family, the Cordulegasterinæ. The cannibalistic habits of Dragon-flies, both in the nymph and imago states, combined with the tremendous external pressure of the many natural checks to increase, have resulted in so marked a separation of the types that with a few exceptions, such as *Libellula pulchella*, *Diplax rubicundula* and *Gomphus exilis*, which are common everywhere, each species may be said to have its particular brook, or pond, or series of pools, or its special season. It is obvious, therefore, that when a marsh is drained, a pool filled, or a brook condemned to servitude as part of the drainage system of city or village, a species formerly abundant may become extinct in a given locality. Another potent factor in the extinction of species among Dragon-flies is the introduction of new and strange varieties of fish to our ponds and streams. Between the Odonata and the old-time denizens of our waters there had come to be, if not an *entente cordiale*, at least a *modus vivendi*; but the new-comers, with the eyes of travelers, view everything from a novel standpoint, to the disadvantage of the Dragon-flies. The extent to which the introduction of German carp, feeding upon muddy bottoms, may be responsible for an increase in the number of mosquitoes, presents an interesting subject for investigation.

The above considerations indicate the desirability of a careful study of this interesting group of insects, that collections and records may be preserved for future students, who may find it difficult or impossible to secure specimens which may now be obtained with comparative ease. In some states, notably Massachusetts, New York, Pennsylvania, Ohio and Louisiana, this work has already been done with a tolerable degree of thoroughness. In the last-named state an effort has been made to interest the children of the schools, nets and full instructions for collecting and preservation being furnished the teachers in many parishes,

with the result that more than sixty species have already been identified, with the probability that others will be added to the list as the state is more fully explored. It is hoped that through the influence of the Manchester Institute all the species to be found in New Hampshire may soon be identified and recorded. As affording an admirable introduction to the study of this group of insects, and for ready reference to convenient tables, every student should possess a copy of Calvert's "Catalogue of the Odonata—Dragonflies of the Vicinity of Philadelphia," published by the American Entomological Society, at Philadelphia. If possible, Hagen's Neuroptera of North America, published by the Government among the papers of the Smithsonian Institution, should also be secured; but this valuable treatise is now out of print and can only be obtained at second-hand bookstores, as chance opportunities may occur. For collection, a net and cyanide bottle are indispensable. The insects should be carefully examined and described while still fresh, as the brilliant colors soon begin to disappear, and it is always desirable to insert in every specimen designed for preservation a bristle, or some other substance that is tolerably firm and at the same time slightly elastic. A corn broom will be found to furnish excellent material for the purpose. The student will soon learn to recognize the more common species on the wing, and only so many individuals should be secured as are desired for study and preservation. By reason of their usefulness as insect destroyers, no less than for their beauty of form and color and grace of motion, Dragon-flies deserve to be classed, in popular consideration, alongside of birds.

The identification of the Institute's specimens of Zygoptera, or Dragon-flies with front and hind wings similar, included in the family Agrionidæ, is not sufficiently complete to warrant their consideration in the present paper. Attention will therefore be given only to the representatives of the sub-order Anisoptera, or Dragon-flies with wings dissimilar and held horizontally in repose. This sub-order includes the families Aeschnidæ and Libellulidæ; representatives of the sub-families Gomphinæ, Aeschninæ, Cordulinæ and Libellulinæ being found in our collection. Familiarity with the limited collection now in the possession of the Insti-

tute will enable the members of the Entomological Section to bear in mind what vacancies it is desirable to fill during the coming summer, in order that the Odonata of our immediate vicinity may be fully represented.

## **I. Family Aeschnidæ.**

### **I. Sub-Family Gomphinae.**

#### **1. Hagenius Selys.**

Calvert, p. 225 ; Hagen, Syn. Neur. N. A. p. 114.

##### **1. Hagenius brevistylus Selys.**

Calvert, p. 241.

The Institute possesses one specimen of this magnificent representative of the Gomphine type ; a male, length 75 millimetres, and wing expanse 100 millimetres.

#### **2. Gomphus Leach.**

Calvert, p. 222 ; Hagen, Syn. Neur. N. A. p. 98.

##### **2. Gomphus exilis Selys.**

Calvert, p. 243 ; Hagen, Syn. Neur. N. A. p. 108.

The most common Gomphine about Manchester. Easily recognized by its prevailing brown and green, especially by its nearly straight, blackish-brown abdomen, marked with basal, dorsal green spot or band on segments 1-10. Length, 40-42 ; alar expanse, 50-52. Male and female in collection.

##### **3. Gomphus vastus Walsh.**

Calvert, p. 245.

This Gomphus, easily recognized by the dilation of abdominal segments 7-9, is a beautiful species, strongly marked with green-

ish yellow, brown and black. Its range is from Quebec to the District of Columbia, but it appears to be rare. Calvert's legend reads: "One male flew in shop at Sixth and Chestnut Sts. Phila. May 28, 1891." One female in collection. Length, 45; alar expanse, 57.

#### 4. *Gomphus naevius* Hagen.

Calvert, p. 242.

This, the smallest of our Gomphines, appears to be rare, and is especially noticeable for its whitish abdominal appendages and very short vulvar-lamina — scarcely one-fifth as long as the ninth segment; the apical half is bilobed and the tips rounded. One female. Length, 39; alar expanse, 45.

#### 3. *Dromogomphus* Selys.

Calvert, p. 222.

#### 5. *Dromogomphus spinosus* Selys.

Calvert, p. 245. *G. spinosus*, Hagen, Syn. Neur. N. A. p. 102.

This vigorous representative of the Gomphine type, originally placed by Baron Selys-Longchamp in the genus *Gomphus*, and later, by the same eminent authority, given a place in his new genus, *Dromogomphus*, distinguished by its long third femora and the 5-7 long spines in the antero-inferior row, is more abundant about Lake Winnipisauke than it is around Manchester, where it is, however, occasionally to be met with. Length, 54-61; alar expanse, 76-80.

## II. Sub-Family Aeschninae.

#### 4. *Aeschna* Fabricius.

Calvert, p. 222; Hagen, Syn. Neur. N. A. p. 119.

#### 6. *Aeschna verticalis* Hagen.

Calvert, p. 248; Hagen, Syn. Neur. N. A. p. 122.

This strong-flying "mosquito-hawk" is easily recognized by its

anal triangle of two cells, and the three basal, dorsal teeth on the tenth abdominal segment. One male in the collection. Length, 67; alar expanse, 90.

**7. *Aeschna clepsydra* Say.**

Calvert, p. 248; Hagen, Syn. Neur. N. A. p. 122.

Of special interest by reason of the denticles on the superior carina of the male abdominal appendages. One male in collection. Length, 66; alar expanse, 90.

**8. *Aeschna constrictor* Say.**

Calvert, p. 249; Hagen, Syn. Neur. N. A. p. 123; Scudder, Proc. Bost. Soc. N. H. p. 212, 1886.

Male with anal triangle of three cells; no dorsal teeth on ten. Common about Manchester. Male and female in the collection. Length, 70; alar expanse, 94.

**5. *Anax* Leach.**

Calvert, p. 222; Hagen, Syn. Neur. N. A. p. 117.

**9. *Anax junius* Drury.**

Calvert, p. 249; Hagen, Syn. Neur. N. A. p. 118.

The prince of Dragon-flies. A strong, audacious flyer, putting the skill and patience of the collector to the extreme test. Especially distinguished by the round black spot on the frons, surrounded by yellow, and this again by a dark blue ring. One male in collection. Length, 70; alar expanse, 100.

### **III. Sub-Family Cordulinæ.**

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**6. *Macromia* Rambur.**

Calvert, p. 223.

**10. *Macromia illinoensis* Walsh.**

Calvert, p. 251.

The Cordulinæ are preëminently thicket dwellers, their long, slender legs and unusually developed feet being specially adapted for clinging to twigs, while their wings, although large in *Macromia*, do not appear to be capable of sustained flight. The road across the sandy plain between the Harvey school-house and Goffe's Falls is the particular station for this species in the vicinity of Manchester. Here they are found, about the first week in June, in well-nigh countless numbers, resting in dark thickets by the roadside and ever and anon darting in quick, jerky flight across the roadway, returning, if nothing befalls, almost instantly. Sooner or later, however, it makes its last excursion, for the birds have learned something of the habits of *Macromia*. One need but remain motionless and watchful to observe many a tragedy of a bright June day on the Goffe's Falls road. Sometimes for minutes there will be neither Dragon-fly nor bird in sight—only small insects dancing in the sun. Suddenly a *Macromia* will dart zig-zag across the roadway, and as suddenly a bird will swoop down from a tree above. The bird is not always successful, but not infrequently its aim is correct, and it flies triumphantly to a neighboring bough, where it leisurely swallows the victim, in the process breaking off the wings, which float slowly to the ground. The destruction by the birds is so great that whereas on some particular day hundreds of these Dragon-flies may be observed it will be found next to impossible a week later to secure a single specimen, while a careful observer will discover wings in vast numbers scattered beneath the trees. Terrific as is the slaughter, certain species of birds apparently giving their attention to nothing else while the Dragon-flies last, the succeeding generation of *Macromia* is unaffected, for oviposition has taken place in the dark pools of Cohas brook before the fatal migration to the roadway on the plains is undertaken. The female of *Macromia* is strikingly beautiful, marked with orange and yellow bands upon the abdominal segments. The male is smaller and would not be recognized as being of the same species if the two were not taken together. Length of female, 90 millimetres; alar expanse, 98 millimetres. Length of male, 55–60; alar expanse, 72.

**7. Tetragoneuria** Hagen.

Calvert, p. 223 ; Hagen, Syn. Neur. N. A. p. 140.

**11. Tetragoneuria semiaquea** Burmeister.

Calvert, p. 252 ; Hagen, Syn. Neur. N. A. p. 140.

Smaller than *Macromia illinoensis* and distinctly marked, but with the same Corduline, thicket-haunting characteristics. The station for *Tetragoneuria* near Manchester is in the woods between the Stevens Pond road, beyond Youngsville, and Bald Hill. There is a pool here in which they breed, apparently without competition with other Dragon-flies. The adults emerge the last of May and soon scatter through the woods, choosing spots where the sunlight shimmers through the branches. Here they dart for their insect prey, as does *Macromia*, and are similarly persecuted by the birds. During the severe drought of 1899 the pool was dried up for a considerable period, and it will be of interest to note what effect this circumstance may have upon the species at this station. It is known that some species of Dragon-flies have the power of lying dormant under similar conditions, and it is certain that this particular pool must have been dried in many seasons previous to 1899. Male and female in collection. Length, 38 ; alar expanse, 58.

**8. Neurocordulia** Selys.

Calvert, p. 223.

**12. Neurocordulia obsoleta** Say.

Calvert, p. 252.

A beautiful species, distinguished by the small spots on anti-cubitals, two cross-veins beneath the pterostigma, and the slightly produced, rounded apical margin of tenth segment. One male. Length, 52 ; alar expanse, 74.

**9. Somatochlora** Selys.

Calvert, p. 223.

**13. Somatochlora lepida** Hagen.

Calvert, p. 253.

The pale yellow wings and the bi-colored membranule will catch the eye of the student. One male. Length, 52 ; alar expanse, 62.

## II. Family Libellulidæ.

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### IV. Sub-Family Libellulinæ.

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#### 10. *Pantala* Hagen.

Calvert, p. 223 ; Hagen, Syn. Neur. N. A. p. 141.

#### 14. *Pantala flavescens* Fabricius.

Calvert, p. 254 ; Hagen, Syn. Neur. N. A. p. 142.

This insect, almost world-wide in its distribution, is very rare about Manchester. One male was taken on the island below Amoskeag Falls, September 6, 1898. A female which had been observed in its company escaped. No other individual of *Pantala flavescens* has been taken or seen during three years. One male in collection. Length, 50 ; alar expanse, 87.

#### 11. *Libellula* Linné.

Calvert, p. 224 ; Hagen, Syn. Neur. N. A. p. 150.

#### 15. *Libellula cyanea* Fabricius.

Calvert. p. 258 ; *L. quadrupla* Say, Hagen, Syn. Neur. N. A. p. 157.

A beautiful species and not uncommon about Manchester. Male and female in collection. Length, 45 ; alar expanse, 72 ; female same expanse ; length, 39.

#### 16. *Libellula exusta* Say.

Calvert, p. 258 ; *L. deplanata* Rambur, Hagen, Syn. Neur. N. A. p. 154.

Male and female in collection. Length, 43 ; alar expanse, 72 ; female same expanse ; length, 39.

**17 *Libellula quadrimaculata* Linné.**

Calvert, p. 258; Hagen, Syn. Neur. N. A. p. 150.

This beautiful species, with black and yellow or olive markings, is comparatively rare about Manchester. Migrations of this species have been recorded as follows: Bielfeld, 1881; Dresden, 1881; Neisse Valley, 1881—"two hours in passing;" North Germany, "large swarm," 1881; "every year" in Charente Inférieure, at the end of September; Zierikzee, Holland, May 30, 1883, "from 11 A. M. to 11 P. M.," coming from the southwest; Malino, Sweden, 1883; The Hague, 1884. One male in collection. Length, 45; alar expanse, 74.

**18 *Libellula semifasciata* Burmeister.**

Calvert, p. 258; Hagen, Syn. Neur. N. A. p. 151.

This strong flyer, at first glance resembling *Libellula pulchella*, but readily distinguished by its yellow wing-veins and reddish brown markings, is not very abundant about Manchester. One male in collection. Length, 44; alar expanse, 77.

**19 *Libellula axillena* Westwood; form *incesta* Hagen.**

Calvert, p. 257; Hagen, Syn. Neur. N. A. p. 155.

One male in collection. Length, 52; alar expanse, 74.

**20 *Libellula pulchella* Drury.**

Calvert, p. 259; Hagen, Syn. Neur. N. A. p. 153.

To the collector about Manchester this species soon becomes the most familiar of all the larger Dragon-flies. It is common everywhere but is here most abundant at Dorr's Pond, where great numbers may be found during the first two weeks of July. Three specimens in collection—one male, two females, one of these teneral. Length, 53; alar expanse, 89.

**12 *Plathemis* Hagen.**

Calvert, p. 224; Hagen, Syn. Neur. N. A. p. 149.

**21 *Plathemis trimaculata* De Geer.**

Calvert, p. 259; Hagen, Syn. Neur. N. A. p. 149.

The genus *Plathemis*, like *Libellula*, is characterized by the sinuous nodal sector, which is distinctly waved, but is readily distinguished by the pair of ventral hooks on the first abdominal segment of the male. *Trimaculata*, representing this genus, is comparatively common but difficult to capture. One male in collection. Length, 48; alar expanse, 70.

### 13 *Celithemis* Hagen.

Calvert, p. 224; Hagen, Syn. Neur. N. A. p. 147.

### 22 *Celithemis ornata* Rambur.

Calvert, p. 261; Hagen, Syn. Neur. N. A. p. 182.

Rare. One female. Length, 42; alar expanse, 59.

### 23 *Celithemis elisa* Hagen.

Calvert, p. 261; *Diplax elisa* Hagen, Syn. Neur. N. A. p. 182.

The specimens of this beautifully marked species were taken at Beaver Pond, in Derry, where it is not uncommon. Male and female in collection. Length, 44; alar expanse, 56.

### *Leucorhinia* Brittinger.

Calvert, p. 224.

### 24 *Leucorhinia intacta* Hagen.

Calvert, p. 262; *Diplax intacta* Hagen, Syn. Neur. N. A. p. 179.

Abundant throughout August. Male and female in collection. Length, 31; alar expanse, 51.

### 15 *Diplax* Charpentier.

Calvert, p. 224; Hagen, Syn. Neur. N. A. p. 173.

### 25 *Diplax rubicundula* Say.

Calvert, p. 262; Hagen, Syn. Neur. N. A. p. 176.

The most abundant of all the Anisoptera. Male and female in collection. Length, 33; alar expanse, 50.

### 26 *Diplax semicineta* Say.

Calvert, p. 263; Hagen, Syn. Neur. N. A. p. 176.

This beautiful little Dragon-fly has a wide range in America, being credited from Maine to Maryland, Colorado, New Mexico, Nevada and California. Male and female in collection. Length, 28; alar expanse, 45.

**27 *Diplax vicina* Hagen.**

Calvert, p. 264; Hagen, Syn. Neur. N. A. p. 175.

Nearly as abundant as *rubicundula*, and easily mistaken for it by a careless observer, but readily distinguished by the superior appendages of the male, which have no median, inferior tooth, but bear from 4 to 9 inferior denticles, of which the apical is the largest. Male and female in the collection. Length, 37; alar expanse, 53.

**16 *Mesothemis* Hagen.**

Calvert, p. 225; Hagen, Syn. Neur. N. A. p. 170.

**28 *Mesothemis simplicicollis* Say.**

Calvert, p. 265; Hagen, Syn. Neur. N. A. p. 170.

This peculiarly beautiful bright-green species is very rare about Manchester, the only individual yet secured being taken at Cohas brook, June, 1899. Female in the collection. Length, 41; alar expanse, 67.

# PRELIMINARY NOTES

ON THE

## ORTHOPTERA.

IN THE VICINITY OF MANCHESTER.

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BY MISS SUSY C. FOGG.

During the summer of 1899, to aid in broadening the defined work of the Entomological Section of the Manchester Institute of Arts and Sciences, an effort was made to ascertain existing forms of Orthoptera within a short radius of the surrounding country.

We realize the list to be incomplete, but hope that it may be augmented by future observation and that species may be added which shall be significant of our location on or near the isothermal line separating the great continental provinces.

This ancient order, fossil remains of which are found belonging to the Tertiary period and which, with forms of Neuroptera, are among the oldest types of insects known, has come down to us with its ranks shattered by the severe struggle of competition through the ages, and to-day there is no other order containing so few families and genera as the Orthoptera, which is at the same time proportionately numerous in individuals.

The Grasshopper is a representative type of this order, and although not a form of high specialization, neither has it degenerated, as is true of many types of insects. All that it has ever been it still is.

The variation in form of the several Orthopteran groups, their long, long history, interwoven with the world's own, their economic bearing, which is of vital importance, the beauty of certain species included within the Acrididæ and Locustidæ, and their peculiar place in literature, all tend to make the order an interesting study to the entomologist.

With some exceptions, however, the paths are not all straight to the would-be explorer, as he often loses himself in the tangle and confusion of, shall I say, a too diversified nomenclature.

S. H. Scudder, in his most admirable work on "Revision of Melanopli," gives a striking though perhaps exaggerated illustration of this in *Melanoplus femur-rubrum*, our common red-legged locust. This insect has appeared under the following names, applied to it by various authorities :

<i>Acridium femur-rubrum</i> ,	De Geer,	1773
<i>Gryllus (Locusta) femur-rubrum</i> ,	Goeze,	1778
<i>Gryllus (Locusta) erythropus</i> ,	Gmelin,	1788
<i>Acridium femorale</i> ,	Olivier,	1791
<i>Gryllus erythropus</i> ,	Turton,	1806
<i>Caloptenus femur-rubrum</i> ,	Burmeister,	1838
<i>Acridium (Caloptenus) femur-rubrum</i> ,	De Haan,	1842
<i>Pezotettix (Melanoplus) femur-rubrum</i> ,	Stal,	1873
<i>Melanoplus femur-rubrum</i> ,	Scudder,	1874
<i>Caloptenus devorator</i> ,	Scudder,	1875
<i>Caloptenus sanguinolentus</i> ,	Provancher,	1876
<i>Caloptenus atlantis</i> ,	Provancher,	1877
<i>Pezotettix femur-rubrum</i> ,	Stal,	1878
<i>Melanoplus interior</i> ,	Scudder,	1879
<i>Melanoplus devorator</i> ,	Scudder,	1879
<i>Caloptenus (Melanoplus) femur-rubrum</i> ,	Cauldfield,	1887

This observation is made with due respect and sympathy for those who have striven to overcome the difficulty.

If we choose to include the Forficulidæ, about which there has been much difference of opinion, six of the seven families of Orthoptera are represented within our limits, the Blattidæ and saltatorial divisions being greatly in excess, the former having, doubtless, been protected by their secluded habits, the latter by their increased power of locomotion, and in many instances by protective coloring.

As two abundant species of like habits and food requirements cannot long coëxist in any small area—the stronger being destined to survive, the other to perish—so, probably, many former species have disappeared from our midst, and the number is small compared with the distribution over the country as a whole.

On the other hand we may not be surprised to find new arriv-

als in our fields, as the range of any species is constantly undergoing change through migration, and transportation of eggs and young nymphs by means of timber, hay and other commercial products, and climatic conditions.

In the list given below the division into families is that employed by Prof. Comstock, in his "Manual for the Study of Insects," and in determining genera and species reference has been made to the following works:

- Comstock, J. H., An Introduction to Entomology.
- Fernald, G. H., The Orthoptera of New England.
- Hancock, J. L., Treatise on Grouse Locusts.
- Harris, T. W., Insects Injurious to Vegetation.
- Packard, A. S., Guide to the Study of Insects.
- Scudder, S. H., Catalogue of the Orthoptera of North America.
- Scudder, S. H., Revision of the Orthopteran Group Melanopli.

As before noted, the scientists have not agreed upon the order in which the family Forficulidæ should be placed.

In general appearance the Earwig closely resembles the rove-beetle, if to the elongated body of the latter, with its short wing-covers beneath which the true wings are neatly folded, could be added abdominal appendages in the form of sharp, pointed forceps, which probably suggested the name, Forficula, meaning literally "little nippers." It was classed with the Coleoptera by Linnæus.

Leach and Kirby ranked the family as a distinct order, to which they gave the name Dermaptera; and Westwood called it Euplexoptera.

Other writers, noting that the family had apparently four wings, biting mouth-parts and incomplete metamorphosis, in common with well-regulated families of Orthoptera, so included it.

The Earwig is rare in this section. Contrary to nursery tales and delusions of childhood, it is not harmful to man.

In Europe, where they abound in great numbers, they are said to become serious pests, feeding upon different kinds of vegetation and having no objection to a diet more especially designed for the human family.

One small species is found within our city limits, *Labia minor* Linnæus, or *Labia minuta* Scudder.

GROUP I. **Cursoria or Runners.**FAMILY 1. **Blattidæ or Cockroaches.**

- 1 **Blatta germanica** Fabricius.
- 2 **Periplaneta americana** Fabricius.
- 3 **Pycnoscelus obscurus** Scudder.

*B. germanica* is a foreign species, commonly known as the "Croton Bug," from its having been first observed about the Croton aqueduct in New York city. Though introduced from Europe it is everywhere abundant. This species requires several months to reach maturity, and structurally has attained some degree of specialization, but it is notoriously unpopular and the best that can be said of it is that it is a good destroyer of bed-bugs, which abound in tenement districts and on ship-board.

*P. americana* is commonly distributed about our fields and appears identical with the well-developed species found about our mills.

*P. obscurus* is a wingless species which is also common.

GROUP II. **Ambulatoria or Walkers.**FAMILY 2. **Phasmidæ or Walking Sticks.**

- 1 **Diapheromera femorata** Say.

The Phasmidæ are represented in our vicinity by a single genus, and during the past summer but few specimens have been found. One of these, however, was of unusual size, measuring fully six inches, including length of body and antennæ.

GROUP III. **Saltatoria or Jumpers.**FAMILY 3. **Acrididæ or Locusts—Short-horned Grasshoppers.**I. SUB-FAMILY **Tryxalinae.**

- 1 **Chloealtis conspersa** Harris.

**2** *Stenobothrus curtipennis* Harris.

**3** *Stenobothrus maculipennis* Scudder.

*C. conspersa* and *S. maculipennis* appeared to be rare, but *S. curtipennis* was everywhere abundant.

## II. SUB-FAMILY **Ædipodinae.**

**1** *Arphia sulphurea* Fabricius.

**2** *Arphia xanthoptera* Burmeister.

**3** *Chortophaga viridifasciata* De Geer.

**4** *Dissostertia æqualis* Say.

**5** *Dissostertia carolina* Linnæus.

**6** *Encoptolophus sordidus* Burmeister.

**7** *Hippiscus rugosus* Scudder.

**8** *Hippiscus tuberculatus* Pallisot de Beauvois.

**9** *Psinidia fenestralis* Serville.

*A. xanthoptera* and *D. æqualis* were found to be abundant on the sandy plains near Rock Rimmon, and *D. carolina* and *D. sordidus* were everywhere conspicuous on account of their great numbers, the specific name of the former, *carolina*, having no significance as to range. Specimens of *P. fenestralis*, both with rose and orange colored wings, were also found in the vicinity of Rock Rimmon.

## III. SUB-FAMILY **Acridinae or Spine-breasted Locusts.**

**1** *Acridium alutaceum* Harris.

**2** *Acridium rubiginosum* Harris.

**3** *Melanoplus atlanis* Riley.

**4** *Melanoplus femoratus* Burmeister.

**5** *Melanoplus femur-rubrum* De Geer.

*A. alutaceum* has been taken at but one station, Plumer Hill,

on the border line between this city and Bedford. It is a fact worthy of investigation that, so far as is known, *A. rubiginosum* has not been found upon this side of the river, while upon the west bank it is not uncommon.

*M. atlantis* and *M. femur-rubrum*, two closely allied species, are the most numerous of all the Acrididæ. They are probably both destructive in their habits to a greater degree than is generally realized, but S. H. Scudder, in his "Revision of the Melanopli," says of *M. atlantis*: "Next to *M. spretus* this is our most destructive locust, and east of the Mississippi probably the only one ever doing much damage. Its injuries, however, are not for a moment to be compared to *M. spretus*, for, though possessing good powers of flight and on rare occasions known to migrate in swarms, its injuries can only be classed as local, and they are never so serious as those inflicted by *M. spretus*; nevertheless, they are by no means slight, and immense destruction of grain is to be laid at its door."

And again, under *M. femur-rubrum*, in Hayden's Report of the Survey of Nebraska, 1872: "I collected several accounts, printed and unpublished, of the injury to crops attributed to this species in the eastern United States. As up to that time *M. atlantis* had not been distinguished from *M. femur-rubrum*, it is possible, and I am now inclined to think it probable, that all the serious injury done to the crops in the East is done by *M. atlantis*; for, although almost everywhere less numerous than *M. femur-rubrum*, *M. atlantis* has been shown to have the capacity for immense multiplication, and has been directly proved to be the culprit in some instances; as it is also much more closely, and indeed very closely, related to the destructive locust of the West. At least until direct, provable charges are made against it, *M. femur-rubrum* should be looked upon as less injurious than *M. atlantis*."

#### IV. SUB-FAMILY *Tettiginæ*.

The members of this curious and interesting sub-family are easily recognized by their small size, absence of pulvilli between the claws, extended pronotum over the abdomen, and their remarkable activity. Four local species have been collected during the past season:

- 1 ***Tettix cucullatus*** Scudder.
- 2 ***Tettix granulatus*** Kirby.
- 3 ***Tettix ornatus*** Say.
- 4 ***Tettigidæ lateralis*** Say.

FAMILY 4. **Locustidæ or Long-horned Grasshoppers.**

GROUP I. **The Cricket-like Grasshoppers.**

- 1 ***Ceuthophilus maculatus*** Harris.

This is the only species known to exist about here.

GROUP II. **The Meadow Grasshoppers.**

- 1 ***Conocephalus ensiger*** Harris.
- 2 ***Xiphidium brevipenne*** Scudder.
- 3 ***Xiphidium fasciatum*** De Geer.

One cannot walk in our grassy fields late in summer without being surrounded by myriads of these graceful little forms, and the two species of *Xiphidium* seem equally abundant. Both the green and the brown forms of *C. ensiger* occur.

GROUP III. **The Katydidæ.**

- 1 ***Scudderia curvicauda*** De Geer.

Specimens of *Amblicoryphora rotundifolia* Scudder, have been received from near Boston, Mass., and in the Boston Museum of Natural History is a specimen credited to the White Mountains, marked "Bequest of C. A. Shurtleff." This species has not yet been found about here, but we hope to determine whether it has a continuous range between the two stations.

FAMILY V. **Grillidæ or Crickets.**

- 1 ***Gryllotalpa borealis*** Burmeister.

2 **Gryllus abbreviatus** Serville.

3 **Gryllus luctuosus** Serville.

4 **Nemobius fasciatus** De Geer.

5 **Æcanthus niveus** Serville.

*G. borealis* is rare, but several individuals have been found near an artificial pond at Manchester Centre.

*G. luctuosus* is *G. niger* Harris or *G. neglectus* Scudder.

Both varieties of *N. fasciatus* occur. In one the wings are wanting, and the wing-covers extend half the length of the abdomen; in the other the wings are long and cordate, reaching the tip of the ovipositor in the female, and the wing-covers nearly equal the abdomen.

*Æ. niveus* is generally distributed.

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The poetry of earth is never dead.

When all the birds are faint with the hot sun,  
And hide in cooling trees, the voice will run  
From hedge to hedge about the new mown mead.  
That is the Grasshopper's — he takes the lead  
In summer luxury — he has never done  
With his delights; for when tired out with fun  
He rests at ease beneath some pleasant weed.

The poetry of earth is ceasing never.

On a lone winter evening when the frost  
Has wrought a silence, from the stove there shrills  
The Cricket's song, in warmth increasing ever,  
And seems to one in drowsiness half lost,  
The Grasshopper among some grassy hills.

— *Keats*.

## MISCELLANEOUS OBSERVATIONS.

BY EDWARD J. BURNHAM.

During the autumn of 1899 the attention of the Section was called to two individuals of *Doryphora decemlineata*, in which there was a marked deviation from the type for this species, the third line of each elytron, in one specimen, being supplanted by a distinct row of yellow spots, while in the other specimen the same line was irregularly interrupted. The query suggested is whether this is a recent variation, or whether it may be an instance of reversion to some ancient type in which the elytra were spotted, the spots having gradually united to form lines, in accordance with the theory now quite generally accepted with reference to the development of stripes in the higher animals. It should be remarked that in both specimens the rows of heavy punctures, which border the lines in the typical *decemlineata*, here unite at each interruption, thus more completely isolating each spot or fascia. As the relative frequency of the occurrence of this variation is certain to be of some interest, it is hoped that members of the Section will make careful and extended observations during the coming season.

In his paper on "The Distribution of Insects in New Hampshire," prepared for Hitchcock's Geological Report, Prof. Scudder says of *Labia minuta*: "Smith records the capture of a number of specimens of this earwig at Norway, Me., and we may therefore conclude that it inhabits New Hampshire." Mr. Herbert E. Richardson of this city found the insect in his stable in 1898, and again in 1899. Prof. Scudder's inference was, therefore, correct. The earwig inhabits New Hampshire, at least as far north as Manchester, but it is certainly rare.

*Gryllotalpa borealis* belongs to the Alleghanian fauna, and probably does not extend far into the zone of doubt dividing the two great provinces, but it is occasionally found in Manchester. The four specimens in the Institute collection were secured on the shore of a small pond near Mr. Isaac Huse's, in East Manchester, and an individual was found at Lake Massabesic in the summer of 1899.

It is probable that *Termes flavipes* finds the northern limit of its range near Manchester. Colonies were fairly abundant about the city during the season of 1899, and a few were observed near Sawyer's Pond in Hooksett, but careful search by Mr. George W. Fowler failed to reveal a single specimen in Pembroke, a few miles further to the northward.

It is a significant fact that boys, interested in the collection of butterflies, but ignorant of theories relative to faunal areas, noticed long since that if the Spotted Purple, *Basilarchia astyanax*, was desired, the collecting trip should be made to the southward of Manchester, while if the Banded Purple, *Basilarchia arthemis*, was the object of pursuit, it must be sought to the northward. It is probable that the band of territory common to these two species, and within the limits of which is to be found the hybrid, *Basilarchia astyanax-arthemis*, crossing New

Hampshire irregularly, falls between Manchester and Concord. This last-named butterfly, a variety resulting from the meeting of the Banded Purple of the Canadian province with the Spotted Purple of the Alleghanian, is restricted in its range to a narrow strip which, entering New Hampshire from the vicinity of Norway, Me., bends southward and again northward, passing diagonally across Vermont, skirting the great lakes, crossing Michigan, and disappearing somewhere in the British possessions westward. Scudder, making his map about 1873, located this band with Concord about in the middle, but there is reason to believe that, as determined by the range of *Basilarchia astyanax-arthemis*, it should be brought somewhat southward. There cannot, of course, be any line determined with inflexibility and mathematical exactitude, but careful study through a long series of years—such study as is practicable under the auspices of the Institute—cannot fail to place the boundaries of the two great provinces with approximate precision. Observations, carefully made and faithfully recorded during the next decade, relative to *Basilarchia astyanax-arthemis*, *Gryllotalpa borealis*, *Ecanthus niveus*, *Thyreonotus dorsalis*, *Diaperomera femorata*, *Labia minuta* and *Termes flavipes* will aid materially in the prosecution of this interesting inquiry.

Writing in 1873, Prof. Scudder said: "Probably no State in the Union presents so striking a variety in its animal life as New Hampshire;" and with reference to the determination of the boundary between the Canadian and Alleghanian fauna he added: "The local zoologists of New Hampshire can render science an important service by a careful record of such facts in as many distinct localities as possible." In attempting to carry out this suggestion the Manchester Institute of Arts and Sciences has undertaken a work which, if faithfully performed, will in future years redound to its credit.

One individual of *Cicada septendecem* was found near the Bald Hill road by Mr. Herbert E. Richardson, in June, 1899. Presumably it was one of a limited number composing a sort of advance guard to a more formidable host in 1900. The Seventeen-year Locust was found in considerable numbers about Manchester in 1883, and there is probably a distinct brood in this section, although it appears not to have attracted the attention of hemipterists. Marlett, in his comprehensive monograph of *Cicada septendecem*, makes no reference to this New Hampshire 1883-1900 brood.

Packard, in his "Guide," conveys the inference that Massachusetts is practically the limit of the range of the Ant-Lion northward. He says: "*Myrmeleon obsoletus* Say is not rare in the warmer parts of the country, and has been found at Salem, Mass., by Dr. E. P. Colby. *M. abdominalis* Say has also been found as far north as Milton, Mass., by Mr. J. Schofield." *M. abdominalis* is quite abundant about Manchester. The larvæ are found in the ledges at Rattlesnake Hill in Auburn, and beneath an over-hanging bank on an island in the Merrimack river, immediately below Amoskeag Falls. Specimens of these larvæ were reared to adults by Mr. George E. Burnham, in 1898 and 1899, and also by Mr. Edward H. Fogg in the latter year.

Say's description holds remarkably, the principal variations being in the markings of the feet and the tips of the antennæ; and even here the variations are

slight, although his type was secured near the Rocky Mountains. *M. obsoletus* Say, three individuals, flew into our tent at Cohas brook, in July, 1899, but the larvæ have not been found in this vicinity and the species is not so abundant as *is abdominalis*.

The earth is comparatively small, and whatever transpires upon its surface can be of but slight concern to the universe. Man's egotism not infrequently distorts the perspective through which he contemplates the relations of things. It is undoubtedly true, although it is difficult to comprehend the truth, that the determination on this continent of the extent of the great provinces of fauna and flora, involving as it must unceasing changes for ages in multitudinous forms of life, is of more importance in the history of the earth's development than all that has been accomplished by the red man in the wanderings of ten thousand years, or by the white man in three centuries of occupation.



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MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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**SECTION C.**  
**BOTANY.**

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## SECTION C—BOTANY.

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On Tuesday evening, January 17th, 1899, members of the Natural Science Club, of Manchester, met at the residence of Mrs. J. W. Fellows, for the purpose of organizing a botanical section of the Institute of Arts and Sciences.

Mr. William H. Huse was chosen chairman and Mrs. Alberta A. McLeod secretary of the meeting. After a free discussion it was voted to apply for admission to the Institute as Section C, Botany. The meeting then adjourned to the call of the chairman.

The need of an association of botanical students in central southern New Hampshire has long been felt, for the flora of the region has been very inadequately represented in the catalogues and manuals hitherto published. Observers from the centres of learning who visit the state have almost without exception confined their researches to the mountain districts or along the narrow strip of seacoast, and they have apparently conceived the idea that the northern boundary of Massachusetts extends not only several miles into the air but also several feet under ground, thus constituting an impassable barrier to the northerly distribution of plants as well as of birds. Yet it is not they who are to blame for the unsatisfactory representation of our local flora — we must take that burden upon ourselves. It is not from the lack of floral wealth that we have suffered but from the lack of local botanists. It is astonishing how the flora of a given region will suddenly expand and bloom with rare and unsuspected treasures, when scrutinized by a few pairs of observant eyes. Soon an intellectual springtime is inaugurated and botanists begin to bud on every bush. It is the mission of such an organization as ours to see that these buds are properly developed with a view to the production in due course of time of sound fruit.

The botanists connected with Dartmouth College have published a flora of their district, i. e., an area enclosed by a circle of thirty miles radius, with Hanover as the centre. Half of this area being within the state of Vermont, and the other half chiefly

within the White Mountain region of our own state, the characteristic flora of the Merrimack valley is practically unrepresented. The botanists in the vicinity of the seacoast also, while they have made many valuable contributions to the knowledge of plants in their peculiar and restricted area, have done and can do nothing to relieve us of the burden of original investigation within our own area. The "Preliminary List of Plants" published herewith represents the first step towards the accomplishment of a systematic and exhaustive investigation of the flora of central southern New Hampshire.

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## REPORTS OF MEETINGS—1899.

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Monday evening, February 6th. At the call of the chairman of the preliminary meeting of January 17th the first regular meeting of the section was held at the rooms of the Institute, for the purpose of organization, Mr. Luther C. Baldwin in the chair. Mr. E. H. Fogg, Mr. F. W. Batchelder and Miss May W. Davis were appointed a committee to nominate officers, and reported the following names: President, Mrs. Alberta A. McLeod; Vice President, Mrs. Clara E. Williams; Secretary, Miss Ellen E. Connor; Treasurer, Miss Ellen F. Wiggin; Corresponding Secretary, Mr. F. W. Batchelder; Executive Committee, Mr. Luther C. Baldwin, Miss Isabelle R. Daniels, Miss Susan Richardson.

The report of the committee was accepted and the officers nominated were unanimously elected by ballot.

Mrs. Bessie Burnham and Miss Theodora Richardson were appointed a committee to draw up by-laws and report at the next meeting.

It was voted to hold meetings for the present every Tuesday evening at 7.45 P. M. Adjourned to February 14th.

Tuesday evening, February 14th. Regular meeting, the President in the chair. Miss Daniels having declined to serve as a member of the executive committee, the nominating committee was instructed to fill the vacancy at its own discretion.

The committee on by-laws presented their report, which was accepted. The by-laws were then voted upon section by section and unanimously adopted. Adjourned to February 21st.

Tuesday evening, February 21st. Regular meeting, the President in the chair. Mr. Batchelder gave an informal talk on the present unfortunate lack of agreement in regard to botanical nomenclature. Adjourned to February 28th.

Tuesday evening, February 28th. Regular meeting, the Vice President in the chair. After the transaction of routine business adjourned to March 7th.

Tuesday evening, March 7th. Regular meeting. On account of the absence of many members no business was transacted. Adjourned to March 14th.

Tuesday evening, March 14th. Regular meeting, the President in the chair. The office of Corresponding Secretary of the Section having been after due consideration declared superfluous, its duties being comprehended in those of the Corresponding Secretary of the Institute, to facilitate matters Mr. Batchelder tendered his resignation of the office and it was accepted. Mr. Baldwin gave notice that an amendment to the by-laws abolishing the office would be considered at the next meeting.

After the transaction of business Mr. Batchelder gave an introductory talk on the "Unity of the Vegetable Kingdom." After first remarking that during the floral season close at hand the diversity of that kingdom would become sufficiently manifest he proceeded to show its essential unity. With the aid of diagrams and drawings it was shown how the higher plants have been evolved from the lower ones; how the apparent breaks between the sub-kingdoms, instead of being fatal to the evolutionary theory tend rather to corroborate it; how the most complex

organizations may be traced back through less complex to simple ones and finally to the protophytes, ambiguous forms so closely related to corresponding forms in the animal kingdom that it is often difficult and sometimes impossible to decide to which kingdom certain forms should be referred.

Adjourned to March 21st.

Tuesday evening, March 21st. Regular meeting, the President in the chair. The amendment to the by-laws abolishing the office of Corresponding Secretary, due notice of which had been given at the last meeting, was proposed and adopted by a unanimous vote. The Executive Committee reported that they had elected Mr. F. W. Batchelder to fill the vacancy made by the resignation of Miss Isabelle R. Daniels.

At the conclusion of business Mr. Batchelder continued his demonstration of the unity of the vegetable kingdom. Following a review of the last talk an explanation was made of the term "alternation of generations," illustrations being drawn from the life history of the bryophytes and pteridophytes, where the process is more evident than in the thallophytes and spermaphytes. Then followed an explanation of the terms sporophyte and gametophyte and an endeavor to show that in the highest and lowest subkingdoms the alternation of generations, though obscure, is nevertheless a factor in the life history of the plant. The talk concluded with a statement of some of the homologies of the subkingdoms, the cell being the unit of growth and the spore the unit of reproduction in all, while the seed in the spermaphytes is but a highly specialized spore.

Adjourned to March 28th.

Tuesday evening, March 28th. Regular meeting, the President in the chair. There being no business before the meeting the talk of the last session was continued. The particular subjects considered were the parasitism and saprophytism of fungi and of *Buxbaumia* among mosses; the tendency to degradation shown by parasites and saprophytes, e. g., Indian pipe and the broom-rapes among flowering plants; the vascular structure of the sporophyte of *Anthoceros* as foreshadowing the structure of

the pteridophytes. An explanation was made of the words microspore and macrospore, and the homology of the microspore with the pollen of flowering plants shown. The talk concluded with a comparison of the protonema of mosses with the prothallium of ferns, and a definition of the terms antheridium and archegonium.

Adjourned to April 4th.

Tuesday evening, April 4th. Regular meeting, the Vice President in the chair. There being no business to transact the section gave attention to a concluding talk on the unity of the vegetable kingdom. After an explanation of the words heterospory and homospority, a presentation was made of the homologies of pteridophytes and spermatophytes. The pollen-tube was shown to be the male gametophyte or antheridium and the endosperm with ovum or ova the female gametophyte or archegonium, so that the essential parts of the flower, i. e., the stamens and pistils, answer to the essential reproductive organs in the lower sub-kingdoms. The flower having thus been approached from the inside, instead of from the outside as usual, the study of its plan, parts, variations and special adaptations might now properly claim attention.

Adjourned to April 11th.

Tuesday evening, April 11th. Regular meeting, the Vice President in the chair. The resignation of the President, Mrs. Alberta A. McLeod, was read and accepted.

The subject of Mr. Batchelder's talk was the "Plan of the Flower." The terms sporophyll, microsporophyll and macrosporophyll having been explained, it was shown that the stamens are a whorl of microsporophylls and the pistils a whorl of macrosporophylls, i. e., leaves altered for purposes of reproduction. The stonecrop being selected as a typical flower the succession of four whorls of altered leaves was described as follows: An inner whorl of five leaves which are really microsporophylls, i. e., there are five pistils; next, another whorl of five leaves which are really microsporophylls, i. e., there are five stamens; next, a whorl of five colored leaves—supposed to be modified especially to attract insects—i. e., there are five petals; finally, an outer whorl of five leaves which are chlorophyllous like ordinary leaves and serve for

the protection of the flower before it opens, i. e., there are five sepals. The talk concluded with an explanation of the terms monœcious and diœcious, illustrated by flowers of alder, poplar and willow, after which the section proceeded to the analysis of *Symplocarpus fatidus*.

Adjourned to April 18th.

Tuesday evening, April 18th. Regular meeting, the Vice President in the chair. There being no business the section listened to a talk by Mr. Batchelder, who gave a more particular explanation of the spore as the essential factor in the reproductive process throughout the vegetable kingdom. The microspores known as pollen were then considered, the different modes of their distribution by wind and insects enumerated and the function of the pollen-tube described.

Adjourned to April 25th.

Tuesday evening, April 25th. Regular meeting. On account of the absence of many members the meeting was informal. A profitable hour was spent in the analysis of *Epigæa repens*, *Sanguinaria Canadensis*, *Houstonia cerulea* and a cultivated species of *Scylla*.

Adjourned to May 2d.

Tuesday evening, May 2d. Regular meeting, the Vice President in the chair. After routine business, Mr. Burnham made an earnest plea in behalf of the mayflower, deploring its wanton destruction by selfish or thoughtless persons and suggesting that the members of the section do all in their power to arrest its impending extinction by instructing their friends and the public as to the proper method of gathering the flowers. The suggestions were approved and a resolution embodying them was adopted by a unanimous vote.

Mr. Batchelder then gave a talk on the present status of systematic botany as developed by modern evolutionary methods, and particularly as elaborated in the works of Engler and Prantl, the German authorities, where the sequence of orders and families is by far the best because the most natural of any yet pro-

pounded. After an explanation of the terms choripetalæ and gamopetalæ it was shown why the Orchidaceæ are considered the highest of the monocotyledons and Compositæ the highest of the dicotyledons. Just as in ornithology the thrush has been dethroned and the crow put in his place so in botany the rose and the lily have been compelled to yield in favor of the thistle! A diagram of the primal orchid having been drawn upon the black-board it was shown how the original fifteen parts, viz., three sepals, three petals, three outer and three inner stamens and three pistils have been reduced by suppression and coalescence to the present three sepals, three petals, of which one has been transformed into that characteristic feature of the orchid family called the lip, one stamén (or sometimes two) and one exceedingly complex pistil. The peculiar alteration in the position of the parts, caused by the twisting of the ovary so that the lip, which was formerly the upper petal, is directed downward in all our genera, except *Calopogon*, was then described. The talk closed with a hint of the close connection between botanical and entomological studies, revealed by the remarkable specialization which orchids have undergone in the endeavor to secure cross-fertilization by means of insects.

The meeting closed with the examination of fine specimens of *Corema Conradii*, brought from Truro, Mass., by Miss Ellen F. Wiggin.

Adjourned to May 9th.

Tuesday evening, May 9th. Regular meeting, the Vice President in the chair. There being no business on hand the members engaged in the analysis of flowers of the season. Cross sections of the ovaries of *Rhodora*, *Uvularia* and *Coptis* were shown under the compound microscope.

Adjourned to May 16th.

Tuesday evening, May 16th. Regular meeting, the Vice President in the chair. There being no business to transact the members devoted the time to the examination of flowers, of which twenty species were presented for analysis. Suggestions were offered regarding collections for the future herbarium of the Insti-

tute, and instruction was given in the proper method of collecting, pressing and mounting specimens. All members were urged to contribute specimens, so that at the close of the season the foundation of an herbarium adequately representing the local flora might be well established.

Adjourned to May 23d.

Tuesday evening, May 23d. Regular meeting, the Vice President in the chair. After the transaction of business the evening was devoted to the study of flowers. The dioecious flowers of the oak suggested an account of the distribution of that genus in this locality and a description and classification of the eight species found.

Adjourned to May 30th.

Tuesday evening, May 30th. Regular meeting, the Vice President in the chair. There being no business before the section the members devoted the time to the examination of specimens, of which a large number were presented. Among those of special interest were *Nyssa sylvatica* and *Cystopteris fragilis*, brought by members of a picnic-party from Rattlesnake hill. The meeting closed with a systematic analysis of *Sisyrinchium angustifolium*.

Adjourned to June 6th.

Tuesday evening, June 6th. Regular meeting, the Vice President in the chair. There being no business, Mr. Baldwin took charge of the meeting, showing specimens from his herbarium and explaining his method of collecting, pressing and mounting specimens.

Adjourned to June 13th.

Tuesday evening, June 13th. Regular meeting, the Vice President in the chair. The executive committee reported the name of Mrs. Albert O. Brown for President of the section, in place of Mrs. Alberta A. McLeod, resigned. The section then proceeded to ballot and Mrs. Brown was unanimously elected. The Vice President then vacated the chair and it was taken by the newly elected President.

It was voted to discontinue regular meetings until the first Tuesday in September.

A field day was proposed for Friday, June 30th, and Mr. Fogg was appointed a committee of one to make all arrangements.

The members were urgently requested to make collections during vacation, and pressing and drying papers were furnished to all who desired to take them.

Adjourned to September 5th.

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## FIELD DAY.

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Friday, June 30th. A most delightful day was spent in a trip to Hooksett Pinnacle. The weather was perfect and a large party, consisting of members of the section and invited guests, left the city by the morning train north. After a forenoon spent in strolling about the woods at the base of the Pinnacle and around the lovely lake, a picnic dinner was spread in the pavilion. Refreshments disposed of the party ascended the eminence and enjoyed the superb view from the top of the tower. Before leaving the summit the curious little station of *Potentilla tridentata* was inspected and specimens collected. The party returned late in the afternoon, unanimously declaring that the first field-day of Section C had been an unqualified success.

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Tuesday evening, September 5th. Owing to the small number present the meeting was informal.

Adjourned to September 12th

Tuesday evening, September 12th. Regular meeting, the Vice President in the chair. The great increase in the number of meetings, caused by the recent addition of new sections to the Institute, having rendered it inexpedient for this section to meet week-

ly as hitherto it was accordingly decided to meet fortnightly in future. Adjourned to September 26th.

Tuesday evening, September 26th. Regular meeting, Mr. W. E. Moore in the chair. There being no business to transact, Mr. Batchelder proceeded to give an account of new stations of interesting plants in New Hampshire. Before presenting the list he urged the members to carry on the work of investigating the local flora in so systematic and accurate a manner that in the course of time there might be issued by the Institute a full catalogue, similar to those compiled by the botanists of Dartmouth College in New Hampshire and Amherst College in Massachusetts for their respective districts. Preliminary lists should be prepared, to which supplements should be made annually, and original observations recorded—all this with the view of assisting to accomplish some day for New Hampshire what has not yet been done, a just and authoritative presentation of her claim to the most varied flora of any state in the union. He alluded to the very inadequate representation of this district in particular in the published manuals and attributed it solely to the lack of botanists hitherto, a lack which it was preëminently the mission of Section C of the Institute to offset. The list of plants was then read.

Among the rarer ones were the following: *Potentilla tridentata*, *Sorbus sambucifolia*, *Ranunculus multifidus*, *Polygala verticillata*, *Lechea tennifolia*, *Viola rotundifolia*, *Hudsonia ericoides*, *Lonicera ciliata* and *cerulea*, *Triosteum perfoliatum*, *Cassia Marilandica*, *Utricularia resupinata*, (and another species not yet determined from the specimens thus far collected) *Panicum sphærocarpon*, *Aristida gracilis*, *Muhlenbergia tenniflora* and *Eragrostis capillaris*.

Adjourned to October 10th.

Tuesday evening, October 10th. Regular meeting, Mr. Moore in the chair. After business the meeting was devoted to the examination of specimens. Adjourned to October 24th.

Tuesday evening, October 24th. Regular meeting, Miss Caroline E. Wing in the chair. After business Mr. Batchelder by

request gave a review of his talks of last spring. Incidentally he referred to the enormous increase in the number of species of plants known and named since the days of Linnæus. He attributed this increase to a concurrence of several causes, among which were, first, the impetus imparted to botanical study by the introduction of the natural system of classification; second, the exploration of new regions; third, the greater number of observers; fourth, closer and more systematic observation. Another cause, not so legitimate as these, was the tendency now prevalent of magnifying minute differences and of restricting specific definitions, thus multiplying specific and varietal names beyond all due bounds.

Adjourned to November 7th.

Tuesday evening, November 7th. Regular meeting, the Vice President in the chair. After business Mr. Batchelder conducted a special review of the Pteridophyta, illustrating the subject by specimens of *Equisetum*, *Botrychium* and *Lycopodium*.

Adjourned to November 21st.

Tuesday evening, November 21st. Regular meeting, the Vice President in the chair. Adjourned to December 5th.

Tuesday evening, December 5th. Annual meeting, Miss May W. Davis in the chair. The annual report of the Secretary was read and accepted and ordered placed on file. The annual report of the Treasurer was similarly disposed of. Mr. William E. Moore and Mr. Edward H. Fogg were appointed a committee to nominate officers for the ensuing year. They reported the following names: President, Mrs. Albert O. Brown; Vice President, Mrs. J. Arthur Williams; Secretary, Miss Ellen E. Connor; Treasurer, Miss Ellen F. Wiggin. Executive Committee: Mr. F. W. Batchelder, Miss Ellen F. Wiggin, Rev. Charles J. Staples.

The secretary elect having positively declined to serve, the nomination of some other person was left to the nominating committee. The committee then asked for more time, and their request was granted. A very interesting letter from Mr. William H. Huse was read, relating to certain tupelos, from which speci-

mens of bark presented by him to the Institute had been obtained. Adjourned to December 19th.

Tuesday evening, December 19th. Regular meeting, the President in the chair. The resignation of Mrs. Williams as Vice President was read and accepted, and the nominating committee appointed at the last meeting was instructed to bring in the name of some person to fill the vacancy. The nominating committee then reported the name of Mr. F. W. Batchelder for Secretary and he was unanimously elected by ballot. They also reported the name of Miss Caroline E. Wing for Vice President and she was unanimously elected by ballot. Miss Wing was also appointed a member of the executive committee to fill the vacancy caused by the resignation of Miss Connor, the former secretary. Business having been concluded Mr. Batchelder gave a talk on "Fruits Botanically Considered," tracing, as an example, the evolution of the apple from seed to seed.

Adjourned to January 2d, 1900.

## INTRODUCTORY.

The botanists of Dartmouth College in New Hampshire and of Amherst College in Massachusetts in the publication of their local floras defined their areas as circles with a radius of thirty miles from Hanover and Amherst respectively. It will be advantageous to define at the outset what shall be the working area, botanically, of the Manchester Institute. Certain natural and artificial boundaries suggest themselves, within which there is plenty of room, abundance of material and the certainty of not interfering with or being crowded by workers in other areas. Broadly speaking, then, we claim as our proper area the whole of Hillsborough county, the west half of Rockingham county and the south half of Merrimack county. In other words this area may be described as bounded on the west by the Connecticut valley watershed, on the south by the state line, on the east by the Atlantic watershed and on the north by the arc of a circle drawn through Merrimack county with a radius of twenty-five miles from Manchester.

The Preliminary List is precisely what its title implies, the first step towards the goal that is set before us. The most of it is drawn from the observations and collections of the compiler, whose researches have been principally confined to the towns of Pelham and Hudson, Manchester and adjoining towns, and Concord. The intention is to extend observations as soon as may be over the whole area named, and in this work the assistance of all persons interested is solicited. Communications and specimens forwarded to E. J. Burnham, Corresponding Secretary of the Institute, Manchester, N. H., will receive due consideration.

The arrangement of families is that of Engler and Prantl, the great German systematists. The nomenclature is that of Gray's Manual, sixth edition, except in certain families where for good and sufficient reasons the use of a later nomenclature appeared to be preferable.



# PRELIMINARY LIST

OF

## PLANTS

GROWING WITHOUT CULTIVATION IN THE VICINITY OF  
MANCHESTER, NEW HAMPSHIRE.

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COMPILED BY FREDERICK W. BATCHELDER.  
1899.

### PTERIDOPHYTA.

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#### OPHIOGLOSSACEÆ.

- Ophioglossum vulgatum**, L. Rare.
- Botrychium matricariaefolium**, A. Br. Locally abundant.
- ternatum** (Thunb) Sw.
- var. **intermedium**, Common.
- var. **obliquum**, Common.
- \*1 (see notes.) var. **dissectum**, Common, constantly found with the two preceding.
- lanceolatum**, (S. G. Gmel.) Angs. Not common.
- Virginianum**, (L.) Sw. Common.

#### Osmundaceæ.

- Osmunda regalis**, L. Common.
- cinnamomea**, L. Common.
- Claytoniana**, L. Common.

**Polypodiaceæ.**

- Onoclea sensibilis**, L. Common.
- Struthiopteris**, (L.) Hoffm. Concord. Locally abundant.
- Woodsia Ilvensis**, (L.) R. Br. Not rare.
- obtusa**, (Spreng.) Torr. Hudson. Apparently rare.
- Dicksonia punctilobula**, (Michx.) A. Gray. Common.
- Cystopteris fragilis**, (L.) Bernh. Not common.
- Dryopteris acrostichoides**, (Michx.) Kuntze. Common.
- Noveboracensis**, (L.) A. Gray. Common.
- Thelypteris**, (L.) A. Gray. Common.
- cristata**, (L.) A. Gray. Common.
- “ var. **Clintoniana**, (D. C. Eaton) Underw. Occasional.
- marginalis**, (L.) A. Gray. Common.
- spinulosa**, (Retz.) Kuntze. The occurrence of the typical form is not yet established.
- “ var. **intermedia**, (Muhl.) Underw. Common.
- Bootii**, (Tuckerm.) Underw. Common.
- Phegopteris Phegopteris**, (L.) Underw. Common.
- hexagonoptera**, (Michx.) Fée. Less common.
- Dryopteris**, (L.) Fée. Common.
- Woodwardia Virginica**, (L.) J. E. Smith. Locally abundant.
- Camptosorus rhizophyllus**, (L.) Link. Reported from Windham.
- Asplenium platyneuron**, (L.) Oakes. Locally abundant ; often called “rock fern.”

<b>Trichomanes</b> , L.	Rare.
<b>acrostichoides</b> , Sw.	Not common.
<b>Filix-fœmina</b> , (L.) Bernh.	Common.
<b>Adiantum pedatum</b> , L.	Not common.
<b>Pteris aquilina</b> , L.	Common.
<b>Polypodium vulgare</b> , L.	Common.

**Equisetaceæ.**

<b>Equisetum arvense</b> , L.	Common.
<b>sylvaticum</b> , L.	Common.
*2 <b>palustre</b> , L.	Near Amoskeag Falls, Manchester, F. W. Batchelder. Rare.
<b>limosum</b> , L.	Rare?
<b>hyemale</b> , L.	Common.

**Lycopodiaceæ.**

<b>Lycopodium lucidulum</b> , Michx.	Common.
<b>inundatum</b> , L.	Not common.
<b>obscurum</b> , L.	Common.
<b>clavatum</b> , L.	Common.
<b>complanatum</b> , L.	Common.

**Selaginellaceæ.**

<b>Selaginella rupestris</b> , Spring.	Common.
<b>apus</b> , Spring.	On banks of meadow brooks.

**Isoetaceæ.**

<b>Isoetes echinospora</b> , Durieu. var. <b>Braunii</b> , Engelm.	In sandy ponds.
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## SPERMATOPHYTA.

### GYMNOSPERMÆ.

#### Pinaceæ.

<b>Pinus Strobus</b> , L.	Common.
<b>resinosa</b> , Ait.	Less common.
<b>rigida</b> , Mill.	Common.
<b>Larix Americana</b> , Michx.	Common.
<b>Picea nigra</b> , Link.	Common in swamps.
<b>rubra</b> , (Lamb) Link.	Common in higher localities.
<b>Tsuga Canadensis</b> , Carr.	Common.
<b>Abies balsamea</b> , Miller.	Not common.
*3 <b>Chamæcyparis sphæroidea</b> , Spach.	One known station.
<b>Juniperus communis</b> , L.    Francetown.	Not common.
<b>nana</b> , Willd.	Common.
<b>Virginiana</b> , L.	Common.

#### Taxaceæ.

<b>Taxus Canadensis</b> , Willd.	Common.
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### ANGIOSPERMÆ.

### MONOCOTYLEDONES.

#### Typhaceæ.

<b>Typha latifolia</b> , L.	Common.
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**Sparganiaceæ.**

<b>Sparganium eurycarpum</b> , Engelm.	Common.
<b>simplex</b> , Huds.	Common.

**Scheuchzeriaceæ.**

<b>Scheuchzeria palustris</b> , L.	Not common.
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**Alismaceæ.**

<b>Alisma Plantago</b> , L.	Common.
<b>Sagittaria variabilis</b> , Engelm.	Common.
<b>heterophylla</b> , Pursh.	Not rare.
<b>graminea</b> , Michx.	Not rare.

**\*4 Gramineæ.**

<b>Spartina cynosuroides</b> , Willd.	Not common.
<b>Paspalum ciliatifolium</b> , Michx.	Common.
<b>Syntherisma linearis</b> , (Krock) Nash.	Common.
<b>sanguinalis</b> , (L.) Nash.	Common.
<b>Panicum proliferum</b> , Lam.	Rather rare.
<b>capillare</b> , L.	Common.
<b>minus</b> , (Muhl.) Nash.	Common?
<b>agrostoides</b> , Trin. ( <b>agrostidiforme</b> , Lam.)	Common.
<b>virgatum</b> , L.	Not common.
<b>xanthophysum</b> , A. Gray.	Rather rare.
<b>sphaerocarpon</b> , Ell.	Not rare.
<b>Porterianum</b> , Nash.	Common.
<b>macrocarpon</b> , Le Conte.	Common.
<b>clandestinum</b> , L.	Common.
<b>Scribnerianum</b> , Nash.	Common.
<b>pubescens</b> , Lam.	Common.

<b>psammophilum</b> , Nash.	Common.
<b>linearifolium</b> , Scribn.	Common.
<b>dichotomum</b> , L.	Common.
<b>miliaceum</b> , L.	On dumps.
<b>Crus-galli</b> , L.	Common.
<b>Setaria glauca</b> , Beauv.	Common.
<b>viridis</b> , Beauv.	Common.
<b>Italica</b> , Kunth.	A common escape.
<b>Cenchrus tribuloides</b> , L.	Common on river banks.
<b>Leersia Virginica</b> , Willd.	Common.
<b>oryzoides</b> , Swartz.	Common.
<b>Andropogon furcatus</b> , Muhl.	Common.
<b>scoparius</b> , Michx.	Common.
<b>Chrysopogon nutans</b> , Benth.	Not common.
<b>Phalaris Canariensis</b> , L.	A rare escape.
<b>arundinacea</b> , L.	Not common.
<b>Anthoxanthum odoratum</b> , L.	Common.
<b>Aristida dichotoma</b> , Michx.	Common.
*5 <b>gracilis</b> , Ell.	Pelham. F. W. Batchelder. Rare?
<b>Oryzopsis melanocarpa</b> , Muhl.	Windham. Rare.
<b>asperifolia</b> , Michx.	Common.
<b>Canadensis</b> , Torr.	Common.
<b>Muhlenbergia glomerata</b> , Trin.	Common.
<b>Mexicana</b> , Trin.	Common.
<b>sylvatica</b> , Torr. & Gray.	Common.
<b>Willdnovii</b> , Trin.	Concord. Rare.
<b>diffusa</b> , Schreber.	Manchester. Rare.
<b>Brachyelytrum aristatum</b> , Beauv.	Common.

• <b>Phleum pratense</b> , L.	Common.
<b>Alopecurus pratensis</b> , L.	Not common.
<b>Sporobolus neglectus</b> , Nash.	Common.
*6       "       "       "       "       A form.	Concord. Rare?
<b>serotinus</b> , Gray.	Common.
<b>Agrostis alba</b> , L.	Common.
"       "       var. <b>sylvatica</b> , L.	Occasional.
<b>perennans</b> , (Walt.) Tuckerm.	Common.
<b>intermedia</b> , Scribn.	Common.
<b>scabra</b> , Willd.	Common.
<b>Cinna arundinacea</b> , L.	Less common than the next.
<b>pendula</b> , Trin.	Common.
<b>Calamagrostis Canadensis</b> , Beauv.	Common.
<b>Nuttalliana</b> , Steud.	Not common.
*7 <b>Ammophila arundinacea</b> , Host.	Hudson. Introduced.
<b>Holcus lanatus</b> , L.	Not common.
<b>Deschampsia flexuosa</b> , Trin.	Common.
<b>Danthonia spicata</b> , Beauv.	Common.
<b>compressa</b> , Aust.	Common.
*8 <b>Triodia seslerioides</b> , (Michx.) Benth.	Pelham. Accidental?
<b>Eragrostis major</b> , Host.	By railroads.
<b>Purshii</b> , Schrader.	Common.
<b>capillaris</b> , Nees.	Rare.
<b>pectinacea</b> , Gray.	Common.
<b>Dactylis glomerata</b> , L.	Common.

<b>Poa annua</b> , L.	Common
<b>compressa</b> , L.	Common.
<b>nemoralis</b> , L.	Not rare.
<b>serotina</b> , Ehrhart.	Common.
<b>pratensis</b> , L.	Common.
<b>trivialis</b> , L.	Not common.
<b>Glyceria laxa</b> , Scribn. Concord.	Rare?
<b>Canadensis</b> , Trin.	Common.
<b>obtus</b> a, Trin.	Rare.
<b>elongata</b> , Trin.	Common.
<b>nervata</b> , Trin.	Common.
<b>pallida</b> , Trin.	Common.
<b>grandis</b> , Watson.	Common.
*9 <b>Glyceria borealis</b> , ( <b>G. fluitans</b> , R. Br.; var. <b>angustata</b> , Vasey in Fernald, Proc. Port. Soc. Nat. Hist. ii, 91; <b>Panicularia bore-</b> <b>alis</b> , Nash. Bull. Torr. Cl. xxiv, 348.)	Common.
<b>Festuca ovina</b> , L.	Common.
"      "      var. <b>duriusecula</b> , Koch.	Common.
<b>rubra</b> , L.	Common.
<b>nutans</b> , Willd.	Not common.
<b>elatior</b> , L.	Common.
<b>Bromus secalinus</b> , L.	Not common.
<b>ciliatus</b> , L.	Common.
"      var. <b>purgans</b> , Gray.	Occasional.
<b>Agropyrum repens</b> , Beauv.	Common.
<b>Hordeum jubatum</b> , L. Manchester.	Rare.
<b>Elymus Virginicus</b> , L.	Common.
<b>Canadensis</b> , L.	Common.

<b>Asprella Hystrix</b> , Willd. Hudson.	Not common.
<b>Triticum vulgare</b> ,	An occasional escape.
<b>Secale cereale</b> ,	A common escape.
<b>Hordeum vulgatum</b> ,	An occasional escape.
<b>Avena sativa</b> ,	A common escape.
<b>Zea Mays</b> ,	An occasional escape.

**Araceæ.**

<b>Arisaema, triphyllum</b> , Torr.	Common.
<b>Peltandra undulata</b> , Raf.	Common.
<b>Calla palustris</b> , L. Concord.	Rare.
<b>Symplocarpus foetidus</b> , Salish.	Common.
<b>Acorus Calamus</b> , L.	Not common.

**Lemnaceæ.**

<b>Spirodela polyrrhiza</b> , Schleid.	Common.
<b>Lemna minor</b> , L.	Common.

**Xyridaceæ.**

<b>Xyris flexuosa</b> , Muhl.	Not common.
“ “ “ var. <b>pusilla</b> , Gray. Concord.	
Miss S. F. Sanborn.	Not common.

**Eriocaulaceæ.**

<b>Eriocaulon septangulare</b> , Withering.	Common.
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**Pontederiaceæ.**

<b>Pontederia cordata</b> , L.	Common.
A white flowered form is found, retaining its characters in cultivation.	

**Juncaceæ.**

**Luzula campestris**, DC. Common.

**Melanthaceæ.**

**Veratrum viride**, Ait. Common.

**Uvularia perfoliata**, L. Common.

**sessilifolia**, L. Common.

**Liliaceæ.**

**Lilium Philadelphicum**, L. Common.

**Canadense**, L. Common.

**Erythronium Americanum**, Ker. Common.

**Convallariaceæ.**

**Clintonia borealis**, Raf. Common.

**Smilacina racemosa**, Desf. Common.

**stellata**, Desf. Common.

**Maianthemum Canadense**, Desf. Common.

**Streptopus amplexifolius**, DC. Manchester. Rare.

**roseus**, Michx. Concord. Less rare.

**Polygonatum biflorum**, Ell. Common.

**giganteum**, Dietrich. Not common.

**Medeola Virginiana**, L. Common.

**Trillium erectum**, L. Not common.

**cernuum**, L. Common.

**erythrocarpum**, Michx. Locally abundant.

**Asparagus officinalis**, L. Escaped from cultivation.

**Smilacææ.**

<b>Smilax herbacea</b> , L.	Common.
<b>rotundifolia</b> , L.	Common.

**Amaryllidacææ.**

<b>Hypoxis erecta</b> , L.	Common.
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**Iridacææ.**

<b>Iris versicolor</b> , L.	Common.
* <sup>10</sup> <b>Sisyrinchium angustifolium</b> . Mill.	Common.
<b>anceps</b> , Cav.	Common.

**Orchidacææ.**

<b>Microstylis ophioglossoides</b> , Nutt.	Manchester.	* Two stations.
<b>Liparis liliifolia</b> , Richard.	Manchester.	Rare.
<b>Loeselii</b> , Richard.	Concord.	Rare.
<b>Corallorhiza innata</b> , R. Br.		Not common.
<b>odontorhiza</b> , Nutt.		Rare.
<b>multiflora</b> , Nutt.		Common.
* <sup>11</sup> <b>Spiranthes cernua</b> , Richard.		Common.
<b>gracilis</b> , Bigelow.		Common.
* <sup>12</sup> <b>Goodyera repens</b> , R. Br.		Common.
<b>pubescens</b> , R. Br.		Common.
<b>Arethusa bulbosa</b> , L.		Locally abundant.
<b>Calopogon pulchellus</b> , R. Br.		Common.
<b>Pogonia ophioglossoides</b> , Nutt.		Common.
<b>verticillata</b> , Nutt.	Manchester. Auburn.	Locally abundant.

<b>Habenaria tridentata</b> , Hook.	Common.
<b>virescens</b> , Spreng.	Common.
<b>bracteata</b> , R. Br.	Rare.
<b>hyperborea</b> , R. Br.	Rare.
<b>Hookeri</b> , Torr.	Common.
<b>orbiculata</b> , Torr.	Not common.
*13 <b>blephariglottis</b> , Torr.	Very rare.
<b>lacera</b> , R. Br.	Common.
<b>psychodes</b> , Gray.	Less common than the next.
*14 <b>fimbriata</b> , R. Br.	Common.
*15 <b>Cypripedium pubescens</b> , Willd. Manchester.	Rare.
<b>spectabile</b> , Salisb. Concord.	Very rare.
<b>acaule</b> , Ait.	Common.

**DICOTYLEDONES.****Juglandaceæ.**

<b>Juglans cinerea</b> , L.	Common.
<b>Carya alba</b> , Nutt.	Common.
<b>porcina</b> , Nutt.	Common.

**Myricaceæ.**

<b>Myrica Gale</b> , L.	Common.
<b>asplenifolia</b> , Endl.	Common.

**Salicaceæ.**

<b>Populus alba</b> , L.	Escaped from cultivation.
<b>dilatata</b> ,	Escaped from cultivation.
<b>tremuloides</b> , Michx.	Common.
<b>grandidentata</b> , Michx.	Common.
<b>balsamifera</b> , L. var. <b>candicans</b> , Gray.	Commonly cultivated.
*16 <b>Salix nigra</b> , Marsh.	Common.
"      "      "      var. <b>falcata</b> , Torr.	Not rare.
<b>lucida</b> , Muhl.	Common.
<b>alba</b> , L.	Escaped from cultivation.
<b>Babylonica</b> , Tourn.	Escaped from cultivation.
<b>rostrata</b> , Richardson.	Common.
<b>discolor</b> , Muhl.	Common.
<b>humilis</b> , Marsh.	Common.
<b>tristis</b> , Ait.	Common.
<b>cordata</b> , Muhl.	Common.

**Betulaceæ.**

<b>Betula lenta</b> , L.	Common.
<b>lutea</b> , Michx. f.	Common.
<b>populifolia</b> , Ait.	Common.
<b>papyrifera</b> , Marsh.	Common.
*17 <b>nigra</b> , L. Pelham, along Beaver brook.	Local.
<b>Alnus incana</b> , Willd.	Common.
<b>serrulata</b> , Willd.	Less common.
<b>Corylus Americana</b> , Walt.	Common.
<b>rostrata</b> , Ait.	Common.
<b>Ostrya Virginica</b> , Willd.	Common.
<b>Carpinus Caroliniana</b> , Walter.	Common.

**Fagaceæ.**

<b>Fagus ferruginea</b> , Ait.	Common.
<b>Castanea sativa</b> , Mill. var. <b>Americana</b> , Watson.	Common.
*18 <b>Quercus alba</b> , L.	Common.
<b>bicolor</b> , Willd.	Common along streams.
*19 <b>Prinus</b> , L.	Not rare.
*20 <b>prinoides</b> , Willd.	Common.
<b>rubra</b> , L.	Common.
<b>coccinea</b> , Wang.	Common.
"        "        var. <b>tinctoria</b> , A. Gray.	Less common.
*21 "        "        " <b>ambigua</b> , A. Gray.	?
<b>ilicifolia</b> , Wang.	Common.

**Ulmaceæ.**

*22 <b>Ulmus fulva</b> , Michx.	Rare.
<b>Americana</b> , L.	Common.

**Moraceæ.**

- \*23 **Morus alba**, L. Escaped from cultivation.

**Urticaceæ.**

- Urtica gracilis**, Ait. Common.  
**Laportea Canadensis**, Gaudichaud. Not rare.  
**Pilea pumila**, Gray. Not rare.  
**Bœhmeria cylindrica**, Willd. Not rare.

**Santalaceæ.**

- Comandra umbellata**, Nutt. Common.

**Polygonaceæ.**

- Rumex crispus**, L. Common.  
**obtusifolius**, L. Less common.  
**sanguineus**, L. Not common.  
**Acetosella**, L. Common.  
**Polygonum aviculare**, L. Common.  
**erectum**, L. Less common.  
**Pennsylvanicum**, L. Common.  
**amphibium**, L. Rare.  
**Hartwrightii**, Gray. Rare.  
**orientale**, L. Escaped.  
**Persicaria**, L. Common.  
**hydropiperoides**, Michx. Common.  
**Hydropiper**, L. Common.  
**acre**, H. B. K. Common.  
**arifolium**, L. Common.  
**sagittatum**, L. Common.  
**ellinode**, Michx. Not common.

<b>dumetorum</b> , L. var. <b>scandens</b> , Gray.	Common.
<b>Fagopyrum esculentum</b> , Moench.	Escaped.
<b>Polygonella articulata</b> , Meisn.	Abundant.

### **Chenopodiaceæ.**

<b>Chenopodium album</b> , L.	Common.
<b>hybridum</b> , L.	Not rare.
<b>Botrys</b> , L.	On dumps.
<b>ambrosioides</b> , L.	Rare.

### **Amarantaceæ.**

<b>Amarantus paniculatus</b> , L.	Common.
<b>retroflexus</b> , L.	Common.
<b>chlorostachys</b> , Willd.	Less common.
<b>albus</b> , L.	Common.
<b>blitoides</b> , Watson. Manchester.	By railroads.

### **Phytolaccaceæ.**

<b>Phytolacca decandra</b> , L.	Rather common.
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### **Aizoaceæ.**

<b>Mollugo verticillata</b> , L.	Common.
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### **Portulacaceæ.**

<b>Portulaca oleracea</b> , L.	Common.
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### **Caryophyllaceæ.**

<b>Dianthus Armeria</b> , L.	An occasional escape.
<b>Saponaria officinalis</b> , L.	Common.
<b>Silene Cucubalus</b> , Wibel.	A frequent escape.
<b>Pennsylvanica</b> , Michx.	Rare.
<b>antirrhina</b> , L.	Rather rare.
<b>Armeria</b> , L.	An occasional escape.

<b>noctiflora</b> , L.	An occasional escape.
<b>Lychnis Githago</b> , Lam.	Rare.
<b>Arenaria lateriflora</b> , L.	Not common.
<b>Stellaria media</b> , Smith. A pest in lawns.	Common.
<b>longifolia</b> , Muhl.	Rather common.
<b>graminea</b> , L.	Becoming common.
<b>uliginosa</b> , Murr.	Not rare.
<b>borealis</b> , Bigel. Concord.	Rare.
<b>Cerastium vulgatum</b> , L.	Common.
<b>arvense</b> , L.	Not common.
<b>Sagina procumbens</b> , L.	Rare.
<b>Buda rubra</b> , Dumort.	Common.
<b>Spurgula arvensis</b> , L.	Not common.

**Nymphæaceæ.**

<b>Brasenia peltata</b> , Pursh.	Common.
<b>Nymphæa odorata</b> , Ait.	Common.
<b>Nuphar advena</b> , Ait. f.	Common.

**Ranunculaceæ.**

<b>Clematis Virginiana</b> , L.	Common.
<b>Anemone cylindrica</b> , Gray.	Not rare.
<b>Virginiana</b> , L.	Common.
<b>quinquefolia</b> , L.	Common.
<b>Hepatica triloba</b> , Chaix.	Rare.
<b>Anemonella thalictroides</b> , Spach. Bedford.	Rare.
<b>Thalictrum polygamum</b> , Muhl.	Common.
<b>purpurascens</b> , L.	Common.
<b>Ranunculus multifidus</b> , Pursh. Hudson.	Rare.
<b>Flammula</b> L. var. <b>reptans</b> , E. Meyer.	Common.
<b>abortivus</b> , L.	Common.

<b>Ranunculus recurvatus</b> , Poir.	Common.
<b>septentrionalis</b> , Poir.	Common.
<b>repens</b> , L. A pest in lawns.	Common.
<b>Pennsylvanicus</b> , L. f.	Not common.
<b>bulbosus</b> , L.	Not common.
<b>acris</b> , L.	Common.
<b>Caltha palustris</b> , L.	Not common.
<b>Coptis trifolia</b> , Salisb.	Common.
<b>Aquilegia Canadensis</b> , L.	Common.
<b>Actæa spicata</b> , L. var. <b>rubra</b> , Ait.	Common.
<b>alba</b> , Bigel.	Common.

#### **Berberidaceæ.**

<b>Berberis vulgaris</b> , L.	Common.
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#### **Lauraceæ.**

<b>Sassafras officinale</b> , Nees.	Common.
<b>Lindera Benzoin</b> , Blume.	Not common.

#### **Fumariaceæ.**

<b>Corydalis glauca</b> , Pursh.	Common.
<b>Fumaria officinalis</b> , L.	An occasional escape.

#### **Papaveraceæ.**

<b>Sanguinaria Canadensis</b> , L.	Rare.
<b>Chelidonium majus</b> , L.	Common near dwellings.

#### **Cruciferaæ.**

<b>Lepidium Virginicum</b> , L.	Common.
<b>Sysimbrium officinale</b> , Scop.	Common.
<b>Brassica nigra</b> , Koch.	Common.
<b>campestris</b> , L.	Common.

<b>Barbarea vulgaris</b> , R. Br.	Common.
<b>Nasturtium palustre</b> , DC.	Common.
<b>officinale</b> , R. Br.	Becoming common.
<b>Capsella Bursa-pastoris</b> , Mœench.	Common.
<b>Arabis Canadensis</b> , L. Pelham.	Rare.

**Sarraceniaceæ.**

<b>Sarracenia purpurea</b> , L.	Common.
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**Droseraceæ.**

<b>Drosera rotundifolia</b> , L.	Common.
<b>intermedia</b> , Hayne.	More abundant than the preceding.

**Crassulaceæ.**

<b>Penthorum, sedoides</b> , L.	Common.
<b>Sedum acre</b> , L.	A common escape.
<b>Telephium</b> , L.	A common escape.

**Saxifragaceæ.**

<b>Saxifraga Virginicensis</b> , Michx.	Common.
<b>Pennsylvanica</b> , L.	Common.
<b>Tiarella cordifolia</b> , L.	Locally abundant.
<b>Chrysosplenium Americanum</b> , Schwein.	Common.

**Grossulariaceæ.**

<b>Ribes rotundifolium</b> , Michx.	Rather rare.
<b>floridum</b> , L'Her.	Rare.

**Hamamelideæ.**

<b>Hamamelis Virginiana</b> , L.	Common.
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**Platanaceæ.**

<b>Platanus occidentalis</b> , L.	Common along streams.
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**Rosaceæ.**

<b>Spiræa salicifolia</b> , L.	Common.
<b>tomentosa</b> , L.	Common.
<b>Rubus odoratus</b> , L.	Not common.
<b>triflorus</b> , Richardson.	Common.
<b>strigosus</b> , Michx.	Common.
<b>occidentalis</b> , L.	Common.
<b>villosus</b> , Ait.	Common.
<b>Canadensis</b> , L.	Common.
<b>hispidus</b> , L.	Common.
<b>Dalibarda repens</b> , L.	Common.
<b>Geum album</b> , Gmelin.	Common.
<b>Virginianum</b> , L.	Common.
<b>strictum</b> , Ait.	Common.
<b>rivale</b> , L.	Not rare.
<b>Fragaria Virginiana</b> , Mill.	Common.
<b>Potentilla Norvegica</b> , L.	Common.
<b>argentea</b> , L.	Common.
<b>fruticosa</b> , L. Hudson.	Not common.
*24 <b>tridentata</b> , Ait. Hooksett.	Rare.
<b>Canadensis</b> , L.	Common.
<b>Agrimonia hirsuta</b> , (Muhl.) Bicknell.	Common.
<b>Poterium Canadense</b> , Benth. & Hook.	Common.
<b>Rosa Carolina</b> , L.	Common.
<b>humilis</b> , Marsh.	Common.
<b>nitida</b> , Willd.	Common.

**Pomaceæ.**

<b>Sorbus Americana</b> , Marsh.	Not common.
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<b>sambucifolia</b> , (C. & S.) Roem. Concord.	Rare.
<b>Aronia arbutifolia</b> , Ell.	Less common than the next.
<b>nigra</b> , (Willd.) Britton.	Common.
<b>Amelanchier Canadensis</b> , Torr. & Gray.	Common.
<b>Cratægus coccinea</b> , L.	Common.

**Drupaceæ.**

<b>Prunus cuneata</b> , Raf. Manchester.	Not rare.
<b>Pennsylvanica</b> , L. f.	Common.
<b>Virginiana</b> , L.	Common.
<b>serotina</b> , Ehrh.	Common.

**Cæsalpinaceæ.**

<b>Cassia Marilandica</b> , L. Pelham.	Rare.
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**Papilionaceæ.**

<b>Baptisia tinctoria</b> , R. Br.	Not common.
<b>Lupinus perennis</b> , L.	Common.
<b>Medicago lupulina</b> , L.	Occasional.
<b>Melilotus officinalis</b> , Willd.	Common.
<b>alba</b> , Lam.	Common.
<b>Trifolium arvense</b> , L.	Common.
<b>pratense</b> , L.	Common.
<b>repens</b> , L.	Common.
<b>hybridum</b> , L.	Common.
<b>agrarium</b> , L.	Common.
<b>incarnatum</b> , L.	Becoming common.
<b>Tephrosia Virginiana</b> , Pers. Pelham.	Not common.
<b>Robinia Pseudacacia</b> , L.	A persistent escape.
<b>viscosa</b> , Vent.	A persistent escape.

<b>hispidula</b> , L.	Sometimes persists.
<b>Desmodium nudiflorum</b> , D C.	Common.
<b>acuminatum</b> , D C.	Common.
<b>rotundifolium</b> , D C. Manchester. Pelham.	Not common.
<b>Canadense</b> , D C.	Common.
<b>Marilandicum</b> , F. Boott. Pelham.	Not common.
<b>Lespedeza reticulata</b> .	Not rare.
<b>Stuevei</b> , Nutt. var. <b>intermedia</b> , Watson.	Common.
<b>polystachya</b> , Michx.	Common.
<b>capitata</b> , Michx.	Common.
<b>Vicia sativa</b> , L.	Common.
<b>Cracca</b> , L.	Common.
<b>Amphicarpæa monoica</b> , Nutt.	Common.
<b>Apios tuberosa</b> , Moench.	Common.

#### Geraniaceæ.

<b>Geranium maculatum</b> , L.	Common.
<b>Carolinianum</b> , L.	Not rare.

#### Oxalidaceæ.

<b>Oxalis corniculata</b> , L. var. <b>stricta</b> , Sav.	Common.
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#### Linaceæ.

<b>Linum usitatissimum</b> , L.	An occasional escape.
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#### Polygalaceæ.

<b>Polygala paucifolia</b> , Willd.	Common.
<b>polygama</b> , Walt. Goffstown. Concord.	Rare.
<b>sanguinea</b> , L.	Common.
<b>verticillata</b> , L. Concord.	Rare.

**Euphorbiaceæ.**

<b>Euphorbia maculata</b> , L.	Common.
<b>Cyparissias</b> , L.	A common escape.
<b>Acalypha Virginica</b> , L.	Common.

**Callitrichaceæ.**

<b>Callitriche verna</b> , L.	Common.
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**Anacardiaceæ.**

<b>Rhus typhina</b> , L.	Common.
<b>glabra</b> , L.	Common.
<b>copallina</b> , L.	Common.
<b>venenata</b> , D.C.	Common, at least in the southern towns.
<b>Toxicodendron</b> , L.	Common.

**Ilicaceæ.**

<b>Ilex verticillata</b> , Gray.	Common.
<b>lævigata</b> , Gray.	Rare.
<b>Nemopanthes fascicularis</b> , Raf.	Common.

**Celastraceæ.**

<b>Celastrus scandens</b> , L.	Common.
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**Aceraceæ.**

<b>Acer Pennsylvanicum</b> , L.	Common in the northern towns.
<b>spicatum</b> , Lam.	Concord. Less common than the preceding.
<b>saccharinum</b> , Wang.	Common.
<b>dasycarpum</b> , Ehrh.	Common.
<b>rubrum</b> , L.	Common.

**Balsaminaceæ.**

**Impatiens fulva**, Nutt. Common.

**Rhamnaceæ.**

**Ceanothus Americanus**, L. Common.

**Vitaceæ.**

**Vitis Labrusca**, L. Common.

**æstivalis**, Michx. Not rare.

**cordifolia**, Michx. Not rare.

**Ampelopsis quinquefolia**, Michx. Common.

**Tiliaceæ.**

**Tilia Americana**, L. Common.

**Malvaceæ.**

**Malva rotundifolia**, L. Common.

**Hypericaceæ.**

**Hypericum ellipticum**, Hook. Common.

**perforatum**, L. Common.

**maculatum**, Walt. Common.

**mutilum**, L. Common.

**Canadense**, L. Common.

**nudicaule**, Walt. Common.

**Elodes campanulata**, Pursh. Common.

**Cistaceæ.**

**Helianthemum Canadense**, Michx. Common.

**majus**, (L.) B. S. P. Hudson. Less common.

\*25 **Hudsonia ericoides**, L. Concord. Rare.

<b>Lechea intermedia</b> , Leggett.	Common.
<b>maritima</b> , Leggett.	Common.
<b>tenuifolia</b> , Michx. Pelham.	F. W. Batchelder, 1899.
	Rare.

**Violaceæ.**

<b>Viola pedata</b> , L.	Common.
<b>palmata</b> , L. var. <b>cucullata</b> , Gray.	Common.
<b>sagittata</b> , Ait. var. <b>ovata</b> , Torr. & Gray.	Common.
<b>blanda</b> , Willd.	Common.
<b>primulæfolia</b> , L.	Not common.
<b>lanceolata</b> , L.	Common.
<b>rotundifolia</b> , Michx.	Rare.
<b>pubescens</b> , Ait.	Not common.
"        "        var. <b>scabriuscula</b> , Torr. & Gray.	Common.
<b>canina</b> , L. var. <b>Muhlenbergii</b> , Gray.	Common.

**Lythraceæ.**

<b>Decodon verticillatus</b> , Ell.	Common.
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**Melastomaceæ.**

<b>Rhexia Virginica</b> , L. Manchester. Goffstown.	Concord.
	Rare.

**Onagraceæ.**

<b>Ludwigia palustris</b> , Ell.	Common.
<b>Epilobium angustifolium</b> , L.	Common.
<b>lineare</b> , Muhl.	Common.
*26 <b>strictum</b> , Muhl.	Common.
<b>coloratum</b> , Muhl.	Common.
<b>adenocaulon</b> , Haussk.	Common.

<b>Oenothera biennis, L.</b>	Common.
“ “ var. <b>cruciata, Torr. &amp; Gray.</b>	Common.
<b>pumila, L.</b>	Common.
<b>Circæa Lutetiana, L.</b>	Common.
<b>alpina, L.</b>	Less common.

**Haloragidaceæ.**

<b>Proserpinaca palustris, L.</b>	Common.
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**Araliaceæ.**

<b>Arallia racemosa, L.</b>	Not rare.
<b>hispida, Vent.</b>	Common.
<b>nudicaulis, L.</b>	Common.
<b>trifolia, Decsne. &amp; Planch.</b>	Common.

**Umbelliferæ.**

<b>Daucus Carota, L.</b>	Common.
<b>Angelica atropurpurea, L.</b>	Not common.
<b>Pastinaca sativa, L.</b>	Common.
<b>Cryptotaenia Canadensis, D.C.</b>	Common.
<b>Sium cicutæfolium, Gmelin.</b>	Common.
<b>Carsonii, Durand. Manchester.</b>	Rare.
<b>Zizia aurea, Koch.</b>	Common.
<b>Carum Carui, L.</b>	A common escape.
<b>Petroselinum, Benth.</b>	An occasional escape.
<b>Cicuta maculata, L.</b>	Common.
<b>bulbifera, L. Fruits abundantly.</b>	Common.
<b>Hydrocotyle Americana, L.</b>	Common.
<b>Sanicula Marilandica, L.</b>	Common.

**Cornaceæ.**

<b>Cornus Canadensis</b> , L.	Common.
<b>florida</b> , L.	Locally abundant.
<b>circinata</b> , L'Her.	Common.
<b>sericea</b> , L.	Common.
<b>stolonifera</b> , Michx.	Common.
<b>paniculata</b> , L'Her.	Common.
<b>alternifolia</b> , L. f.	Common.
*27 <b>Nyssa sylvatica</b> , Marsh.	Common.

**Clethraceæ.**

<b>Clethra alnifolia</b> , L.	Locally abundant.
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**Pyrolaceæ.**

<b>Pyrola secunda</b> , L.	Common.
<b>chlorantha</b> , Swartz.	Common.
<b>elliptica</b> , Nutt.	Common.
<b>rotundifolia</b> , L.	Common.
<b>Moneses grandiflora</b> , Salisb.	Concord, Miss S. F. Sanborn. Rare.
<b>Chimaphila umbellata</b> , Nutt.	Common.
<b>maculata</b> , Pursh.	Less common.

**Monotropaceæ.**

<b>Monotropa uniflora</b> , L.	Common.
<b>Hypopitys</b> , L.	Common.

**Ericaceæ.**

<b>Arctostaphylos Uva-ursi</b> , Spreng.	Not rare.
<b>Epigæa repens</b> , L.	Common.

<b>Gaultheria procumbens</b> , L.	Common.
<b>Andromeda polifolia</b> , L.	Common.
<b>ligustrina</b> , Muhl.	Common.
<b>Cassandra calyculata</b> , Don.	Common.
<b>Kalmia latifolia</b> , L.	Common.
<b>angustifolia</b> , L.	Common.
<b>glauca</b> , Ait. Manchester. Hooksett.	Rather rare.
<b>Rhododendron nudiflorum</b> , Torr.	Common.
<b>Rhodora</b> , Don.	Common.
*28 <b>maximum</b> , L. Manchester.	Very rare.

#### **Vacciniaceæ.**

<b>Gaylussacia resinosa</b> , Torr. & Gray.	Common.
<b>Vaccinium Pennsylvanicum</b> , Lam.	Common.
<b>nigrum</b> , (Wood.) Britton.	Common.
<b>vacillans</b> , Solander.	Common.
<b>corymbosum</b> , L.	Common.
<b>atrococeum</b> , (A. Gray.) Heller.	Common.
<b>Oxycoccus Oxycoccus</b> , (L.) MacM.	Rare.
<b>macrocarpus</b> , (Ait.) Pers.	Common.

#### **Primulaceæ.**

<b>Trientalis Americana</b> , Pursh.	Common.
<b>Steironema cilastum</b> , Raf.	Common.
<b>lanceolatum</b> , Gray.	Less common.
<b>Lysimachia quadrifolia</b> , L.	Common.
<b>stricta</b> , Ait.	Common.
<b>nummularia</b> , L.	Escaped.

**Oleaceæ.**

<b>Fraxinus Americana</b> , L.	Common.
<b>pubescens</b> , Lam.	Common along streams.
<b>sambucifolia</b> , Lam.	Common in swamps.

**Gentianaceæ.**

<b>Gentiana crinita</b> , Frœl.	Becoming scarce.
<b>Andrewsil</b> , Griseb.	Common.
<b>linearis</b> , Frœl.	Common.
<b>Bartonia tenella</b> , Muhl.	Common.

**Menyanthaceæ.**

<b>Menyanthes trifoliata</b> , L.	Not rare.
<b>Limnanthemum lacunosum</b> , Griseb.	Manchester—Co- has brook. Rare.

**Apocynaceæ.**

<b>Apocynum androsæmifolium</b> , L.	Common.
<b>cannabinum</b> , L.	Not common.

**Asclepiadaceæ.**

<b>Asclepias tuberosa</b> , L.	Merrimack.	Concord.	Rare.
<b>purpurascens</b> , L.			Common.
<b>incarnata</b> , L.			Common.
<b>Cornuti</b> , Decaisne.			Common.
<b>obtusifolia</b> , Michx.			Common.
<b>phytolaccoides</b> , Pursh.			Common.

**Convolvulaceæ.**

<b>Convolvulus sepium</b> , L. var. <b>repens</b> , Gray.	Not common.
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**Cuscutaceæ.**

**Cuscuta Gronovii**, Willd. Common.

**Borraginaceæ.**

**Cynoglossum officinale**, L. Not common.

**Echinosperrum Virginicum**, Lehm. Common.

**Myosotis laxa**, Lehm. Piscataquog river meadows. Rare.

**verna**, Nutt. Manchester, on a ledgy hillside. Rare.

**Symphytum officinale**, L. Occasional.

**Verbenaceæ.**

**Verbena urticæfolia**, L. Common.

**angustifolia**, Michx. Not rare.

**hastata**, L. Common.

**Labiatae.**

**Trichostema dichotomum**, L. Common.

**Teucrium Canadense**, L. Not common.

**Collinsonia Canadensis**, L. Pelham. Not common.

**Mentha viridis**, L. Common.

**piperita**, L. Common.

**Canadensis**, L. Common.

**Lycopus Virginicus**, L. Common.

**sinuatus**, Ell. Common.

**Pyknanthemum lanceolatum**, Pursh. Manchester. Pelham. Not rare.

**linifolium**, Pursh. Manchester. Not common.

**muticum**, Pers. Not common.

**incanum**, Michx. Not common.

**Hedeoma pulegioides**, Pers. Common.

<b>Monarda fistulosa</b> , L.	Bedford.	Rare.
<b>Nepeta Cataria</b> , L.		Common.
<b>Glechoma</b> , Benth.		Common.
<b>Scutellaria lateriflora</b> , L.		Common.
<b>galericulata</b> , L.		Common.
<b>Brunella vulgaris</b> , L.		Common.
<b>Leonurus Cardiaca</b> , L.		Common.
<b>Galeopsis Tetrahit</b> , L.	Waste places.	Common.

**Solanaceæ.**

<b>Solanum Dulcamara</b> , L.		Common.
<b>Physalis pubescens</b> , L.	Manchester.	Rare.
<b>Datura Stramonium</b> , L.		On dumps.
<b>Tatula</b> , L.		On dumps.

**Scrophulariaceæ.**

<b>Verbascum Thapsus</b> , L.		Common.
<b>Linaria Canadensis</b> , Dumont.		Common.
<b>vulgaris</b> , Mill.		Common.
<b>Chelone glabra</b> , L.		Common.
<b>Pentstemon pubescens</b> , Solander.		Not common.
<b>Mimulus ringens</b> , L.		Common.
<b>Gratiola Virginiana</b> , L.		Not common.
<b>aurea</b> , Muhl.		Common.
<b>Ilysanthes riparia</b> , Raf.		Common.
<b>Veronica Americana</b> , Schweinitz.		Common.
<b>scutellata</b> , L.		Common.
<b>serpyllifolia</b> , L.		Rather common.
<b>peregrina</b> , L.		Rather common.

<b>Gerardia pedicularia</b> , L.	Not rare.
<b>flava</b> , L.	Common.
<b>quercifolia</b> , Pursh.	Common.
<b>purpurea</b> , L. var. <b>paupercula</b> , Gray.	Common.
<b>tenuifolia</b> , Vahl.	Not rare in the southern towns.
<b>Pedicularis Canadensis</b> , L.	Common.
<b>Melampyrum Americanum</b> , Michx.	Common.

#### Lentibulariaceæ.

*29. <b>Utricularia vulgaris</b> , L.	Common.
<b>resupinata</b> , B. D. Greene. Manchester.	Rare.
<b>cornuta</b> , Michx.	Common.

#### Orobanchaceæ.

<b>Epiphegus Virginiana</b> , Bart.	Not common.
<b>Aphyllon uniflorum</b> , Gray.	Common.

#### Plantaginaceæ.

<b>Plantago major</b> , L.	Common.
<b>Rugelii</b> , Decaisne.	Common.
<b>lanceolata</b> , L.	Common.
<b>Patagonica</b> , Jacq. var. <b>aristata</b> , Gray.	Occasional.

#### Rubiaceæ.

<b>Houstonia cerulea</b> , L.	Common.
<b>purpurea</b> , L. var. <b>longifolia</b> , Gray.	Locally abundant.
<b>Cephalanthus occidentalis</b> , L.	Common.
<b>Galium aparine</b> , L.	Common.
<b>pilosum</b> , Ait. Hudson. F. W. Batchelder.	Rare?
<b>circæzans</b> , Michx.	Common.

<b>trifidum</b> , L.	Common.
<b>asprellum</b> , Michx.	Common.
<b>triflorum</b> , Michx.	Common.

**Caprifoliaceæ.**

<b>Sambucus Canadensis</b> , L.	Common.
<b>racemosus</b> , L. Goffstown. Auburn.	Not common.
<b>Viburnum lantanoides</b> , Michx.	Not rare.
<b>Opulus</b> , L.	Common.
<b>acerifolium</b> , L.	Common.
<b>dentatum</b> , L.	Common.
<b>cassinoides</b> , L.	Common.
<b>Lentago</b> , L.	Common.
<b>Triosteum perfoliatum</b> , L. Hudson. F. W. Batchelder.	Rare.
<b>Linnaea borealis</b> , L.	Rather rare.
<b>Lonicera ciliata</b> , Muhl.	Not rare.
<b>cærulea</b> , L. Manchester. W. H. Huse.	Rare.
<b>Diervilla trifida</b> , Mœnch.	Common.

**Cucurbitaceæ.**

<b>Sicyos angulatus</b> , L.	Less common than the next.
<b>Echinocystis lobata</b> , Torr. & Gray.	Common.

**Campanulaceæ.**

<b>Specularia perfoliata</b> , A. DC.	Not common.
<b>Campanula rotundifolia</b> , L.	Common.
<b>aparinoides</b> , Pursh.	Common.

**Cichoriaceæ.**

<b>Cichorium Intybus</b> , L.	Not common.
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<b>Leontodon autumnalis</b> , L.	Common.
<b>Taraxacum officinale</b> , Weber.	Common.
<b>erythrospermum</b> , Andrz.	Not rare.
<b>Sonchus arvensis</b> , L.	Becoming common.
<b>oleraceus</b> , L.	Common.
<b>asper</b> , Vill.	Common.
<b>Lactuca Canadensis</b> , L.	Common.
<b>integrifolia</b> , Bigel.	Common.
<b>leucophæa</b> , Gray.	Common.
<b>Hieracium aurantiacum</b> , L.	Rare.
<b>Canadense</b> , Michx.	Common.
<b>paniculatum</b> , L.	Common.
<b>venosum</b> , L.	Common.
<b>scabrum</b> , Michx.	Common.
<b>Prenanthes alba</b> , L.	Common.
<b>serpentaria</b> , Pursh.	Common.
<b>altissima</b> , L.	Common.

#### Ambrosiaceæ.

<b>Ambrosia artemisiæefolia</b> , L.	Common.
<b>trifida</b> , L.	Not common.
<b>Xanthium Canadense</b> , Mill.	Common.

#### Compositæ.

<b>Mikania scandens</b> , L. Goffstown.	Rare?
<b>Eupatorium purpureum</b> , L.	Common.
<b>teucrifolium</b> , Willd.	Common.
<b>rotundifolium</b> , L. var. <b>ovatum</b> , Torr.	Rare?
<b>perfoliatum</b> , L.	Common.
<b>ageratoides</b> , L.	Common.

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<b>Liatris scariosa</b> , Willd.	Hooksett.	Rare.
<b>Solidago cæsia</b> , L.		Common.
<b>latifolia</b> , L.	Common in the southern towns.	
<b>bicolor</b> , L.		Common.
<b>puberula</b> , Nutt.		Common.
<b>uliginosa</b> , Nutt.		Common.
<b>speciosa</b> , Nutt.		Not common.
<b>odora</b> , Ait.		Not common.
<b>patula</b> , Muhl.		Not common.
<b>rugosa</b> , Mill.		Common.
<b>ulmifolia</b> , Muhl.		Common.
<b>Elliottii</b> , Torr. & Gray.		Not rare.
<b>neglecta</b> , Torr. & Gray.		Common.
<b>arguta</b> , Ait.		Common.
<b>juncea</b> , Ait.		Common.
<b>serotina</b> , Ait.		Common.
"        " var. <b>gigantea</b> , Gray.		Common.
<b>Canadensis</b> , L.		Common.
<b>nemoralis</b> , Ait.		Common.
<b>lanceolata</b> , L.		Common.
<b>Sericocarpus conyzoides</b> , Nees.		Common.
<b>solidagineus</b> , Nees.		Common.
<b>Aster corymbosus</b> , Ait.		Common.
<b>macrophyllus</b> , L.		Not common.
<b>radula</b> , Ait.		Not common.
<b>Novæ-Angliæ</b> , L.		Not common.
<b>patens</b> , Ait.		Common.
<b>undulatus</b> , L.		Common.

<b>cordifolius</b> , L.	Common.
<b>lævis</b> , L.	Common.
<b>polyphyllus</b> , Willd.	Not common.
<b>ericoides</b> , L.	Common.
<b>multiflorus</b> , Ait.	Common.
<b>vimineus</b> , Lam.	Common.
<b>diffusus</b> , Ait.	Common.
<b>paniculatus</b> , Lam.	Not common.
<b>junceus</b> , Ait.	Not common.
<b>longifolius</b> , Lam.	Not common.
<b>Novi-Belgii</b> , L.	Not common.
<b>patulus</b> , Lam.	Common.
<b>tardiflorus</b> , L.	Common.
<b>puniceus</b> , L.	Common.
<b>umbellatus</b> , Mill.	Common.
<b>linariifolius</b> , L.	Common.
<b>acuminatus</b> , Michx.	Common.
<b>nemoralis</b> , Ait.	Not common.
<b>Erigeron Canadensis</b> , L.	Common.
<b>annuus</b> , Pers.	Not common.
<b>strigosus</b> , Muhl.	Common.
<b>bellidifolius</b> , Muhl.	Common.
<b>Philadelphicus</b> , L.	Less common.
*30 <b>Antennaria plantaginea</b> , R. Br.	Less common than the other species.
“ “ “	var. <b>petiolata</b> , With the type.
<b>Parlinii</b> , Fernald.	Common.
<b>neodioica</b> , Greene.	Common.

<b>neglecta</b> , Greene.	Common.
<b>Canadensis</b> , Greene.	Common.
<b>Anaphalis margaritacea</b> , Benth & Hook.	Common.
<b>Gnaphalium polycephalum</b> , Michx.	Common.
<b>decurrens</b> , Ives.	Common.
<b>uliginosum</b> , L.	Common.
<b>Inula Helenium</b> , L.	Not rare.
<b>Rudbeckia laciniata</b> , L.	Common in the southern towns.
<b>hirta</b> , L.	Common.
<b>Helianthus annuus</b> , L.	Escaped.
<b>divaricatus</b> , L.	Common.
<b>strumosus</b> , L.	Common.
<b>decapetalus</b> , L.	Common.
<b>tuberosus</b> , L.	Escaped.
<b>Bidens frondosa</b> , L.	Common.
<b>connata</b> , Muhl.	Common.
<b>chrysanthemoides</b> , Michx.	Common.
<b>Galinsoga parviflora</b> , Cav.	Lately introduced.
<b>Anthemis Cotula</b> , DC.	Common.
<b>Achillea Millefolium</b> , L.	Common.
<b>Chrysanthemum Leucanthemum</b> , L.	Common.
<b>Tanacetum vulgare</b> , L.	Common.
<b>Artemisia vulgaris</b> , L.	Not rare.
<b>Tussilago Farfara</b> , L.	Rare.
<b>Senecio aureus</b> , L.	Common.
<b>Erechtites hieracifolia</b> , Raf.	Common.

<b>Arctium Lappa, L.</b>	Common.
<b>Cnicus lanceolatus, Hoffm.</b>	Common.
<b>muticus, Pursh.</b>	Not rare.
<b>pumilus, Torr.</b>	Common.
<b>arvensis, Hoffm.</b>	Common.
<b>Krigia Virginica, Willd.</b>	Common.

## NOTES TO PLANT LIST.

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**\*1 Botrychium ternatum, (Thunb.) Sw. var. dissectum.  
(Botrychium dissectum,) Spreng.**

This plant is by no means rare in this section of New Hampshire. It is commonly found growing with the other varieties in about the proportion of one to five. The plants are extremely variable in size and also in the fineness of the cutting of the lobes in the sterile segment of the leaf. The fertile segment is seldom developed. There are numberless gradations between *dissectum* and the other typical forms and it is frequently impossible to decide to which named variety certain plants should be referred. The particularly close connection of *dissectum* with *obliquum* through intermediate forms militates against the propriety of separating the former as a species.

**\*2 Equisetum palustre, L.**

[See *Rhodora*, i. 75.]

**\*3 Chamæcyparis sphæroidea, Spach.**

The only station yet reported is the "rhododendron swamp" located near the northwest corner of Manchester.

[See note on *Rhododendron maximum*, below.]

**\*4 Gramineæ.**

All doubtful or ambiguous plants of this order have been submitted to the most competent authorities for examination and classification. In the difficult and as yet unsettled genus *Panicum* specimens have been verified by Prof. F. L. Scribner, the expert agrostologist of the Department of Agriculture, Washington, D. C.

**\*5 Aristida gracilis, Ell.**

Abundant in Pelham along Beaver brook, the plants varying greatly in size and form, some being single and slender, others rather densely tufted and quite stout.

**\*6 Sporobolus neglectus, Nash.**

Common at least as far north as Concord, where there occurs a form more robust than usual, mostly purplish, and with spikelets approaching those of *S. asper*.

**\*7 *Ammophila arundinacea*, Hots.**

In Hudson near the bridge at Taylor's falls there was formerly a tract of several acres of fine sand, called locally the "great desert." During the prevalence of northwest winds this sand drifted in such quantities as to block the road and seriously impede travel, and also to damage the cultivated fields to the southward. About sixty years ago attempts were made by the town authorities to check the evil. A fence was built on the north side of the road and a row of willows planted on both sides. These means not proving effectual a few years later some persons were authorized by the town to procure this grass from the seashore and a quantity of it was sown or planted on the tract. In the course of time the grass covered the ground to such an extent as to check the drifting sand and make the reclamation of the tract comparatively easy. A large part of the land has been sold for house lots and the "great desert" will soon be obliterated by the eastward growth of this pleasant suburb of Nashua.

**\*8 *Triodia seslerioides*, (Michx.) Benth.**

This handsome grass was found growing abundantly in the vicinity of a grist mill in Pelham. It had the appearance of being perfectly at home, and if introduced, which is altogether probable, must have persisted for a number of years.

[See also *Rhodora*, i. 67, concerning a Connecticut station of this species.]

**\*9 *Glyceria borealis*.**

This northern grass appears to be well distinguished from its southern ally, *G. fluitans*, by the *more erect culms, narrower leaves, membranous ligule, narrower panicle with more appressed branches and spikelets and membranous flowering scales with hispidulous nerves.*

It here receives for the first time its proper designation as a *Glyceria*.

**\*10 *Sisyrinchium*.**

There are at least three well marked forms in our area. The genus is at present undergoing critical study and revision, and observers are advised to be on the lookout for hitherto undescribed forms.

**\*11 *Spiranthes cernua*, Richard.**

The excessive drought of the season of 1899 prevented satisfactory observations of this species, the plants being very scarce and poorly developed. In Gray's Manual, 6th edition, the species is placed in the same section with *S. latifolia* and *Romanzoffiana* as having "the flowers in three ranks crowded in a close spike." In Britton & Brown's Illustrated Flora the description reads, "flowers three-ranked—stems not twisted, or but slightly so," and under the species, "flowers in three rows." Careful observation in our area shows that from thirty

to forty per cent of the plants have the flowers in a one-ranked spike, as in *S. gracilis*. As regards the twisting of the spike there is every gradation from the straight spike to the extreme twisted or corkscrew form. As a rule the one-ranked spikes are more twisted than the three-ranked ones, and the corkscrew form occurs principally in many-flowered one-ranked spikes, the degree of twist being about in proportion to the number of flowers. In large and vigorous plants the one-ranked arrangement is as frequent as in small ones, though less evident at first glance on account of the crowding of the flowers. No difference in the flowers themselves has yet been observed to accompany the different arrangements of the inflorescence.

[See also *Rhodora*, i, 110.]

#### \*12 *Goodyera*.

This genus is now undergoing revision. Plants hitherto known as *G. repens* are more than likely to be the variety *ophioides* or the species *tesselata*. Observations will be in order.

[See *Rhodora*, i, 2.]

#### \*13 *Habenaria blephariglottis*, Torr.

The single station of this species in Manchester has been, unhappily, too well known, and the plants are now nearly if not quite exterminated.

#### \*14 *Habenaria fimbriata*, R. Br.

Abundant in the vicinity of Manchester. The study of its forms is extremely interesting. There are two well marked forms which are so constant in their differences as to demand a special account. What may be called typical *fimbriata* begins to bloom about the 1st of June. The flowers are scentless, except for the rank odor common to the orchid family, and are gone by the 1st of July. Soon after July 1st the other form begins to flower, some plants being found in flower as late as August 25th. In this form the flowers are richly scented, having a fragrance similar to that of *H. psycodes*, but less heavy. The lip and petals are deeply cut, sometimes almost as much as in *H. lucida*, the pedicels are more slender than in the early form and the whole plant has a more delicate and graceful aspect. There are two abundant stations of this late form known. In one of them the flowers vary in shade from pinkish to rather dark purple; in the other, besides the plants with light and dark purple flowers, there are always some with pure white flowers.

The differences may be summarized thus: Early form, June 1st to July 1st, flowers purple, not fragrant, rather stoutly pedicelled, with lip and petals not deeply cut; late form, July 1st to August 25th, flower dark to light purple, pinkish or pure white, very fragrant, with rather slender pedicels and with lip and petals deeply cut.

So far as observed the two forms do not grow together, though *H. psychodes* is found in both stations of the late form. The forms are persistent, being found in the same stations year after year. The personal observations of the compiler extend over a period of six years. The white form had been known for an indefinite period before his observations began.

**\*15 *Cypripedium pubescens*, Willd.**

A number of these plants were removed to a "wild bed" in a city lot. There they have thriven and multiplied for several years. During this time the plants have undergone a marked change in appearance, becoming smaller and producing smaller flowers, in which the lip is strongly compressed laterally, is more pointed at the apex and has assumed a paler shade of yellow. Several plants of *C. parviflorum* which were set out at the same time have undergone no apparent change from year to year. It seems, therefore, more likely that the changes in *C. pubescens* are the result simply of the changed habitat and not of cross-fertilization with *C. parviflorum*.

**\*16 *Salix*.**

This baffling genus is not yet well understood. The list given is but tentative and takes no account of the numerous hybrids, which doubtless exist here as everywhere.

**\*17 *Betula nigra*, L.**

The red or river birch is very abundant along Beaver brook in Pelham for at least four miles north of the Massachusetts line. The trees are undoubtedly members of a westerly extension into this corner of New Hampshire of the remarkable station discovered many years ago at Spickett Falls in Methuen, by Mr. George B. Emerson, and described in his *Trees and Shrubs of Massachusetts*, (p. v.)

**\*18 *Quercus*.**

Manchester is unusually rich in oaks. Of the eight species named the most abundant is *coccinea*, the rest following in about this order—*alba*, *ilicifolia*, *rubra*, *prinoides*, *tinctoria*, *bicolor*, *Prinus*. They may all be found in the compass of a square mile in West Manchester.

**\*19 *Quercus Prinus*, L.**

Two stations of the rock chestnut oak have been examined, one in Manchester at Rock Rimmon, the other in Auburn, six miles distant. The cutting of the leaves varies greatly, those on the finest, best-developed trees being often as nearly entire as those of typical *bicolor* or of the chestnut, while on stunted, ill-devel-

oped trees they are often as deeply lobed as in *alba*. There are also at both stations trees with long-peduncled fruit as in *bicolor*, the leaves accompanying them being of the less deeply-lobed sort.

**\*20 *Quercus prinoides*, Willd.**

Abundant as far as several miles north of Manchester but not yet observed at Concord. Tree-like plants are not rare. Some such in Hudson are 15 feet high with stems 5 inches in diameter. Others in Manchester are 20 to 22 feet high with stems 3 inches in diameter. These large forms appear to be old and little or no fruit is found on them. So far as observed they do not show any approach to *Q. Muhlenbergii* except in size.

**\*21 *Quercus coccinea*, Wang. var. *ambigua*, Gray.  
(*Quercus ambigua*, Michx.)**

There are several trees at Manchester which are puzzling, from their combination of the characters of *Q. rubra* and *Q. coccinea*. Since it is not known precisely what Michaux meant by his *Q. ambigua* intermediate forms cannot with propriety be given that name. The trees observed have the aspect and foliage of *Q. rubra* while the fruit resembles that of *Q. coccinea*; but the fruit varies on different plants, being large on some and small on others, having the cups sometimes thick and sometimes thin and the scales sometimes appressed and sometimes slightly squarrose.

The tendency among recent students of the genus is to consider such intermediate forms as forms only. One of our best authorities is of the opinion that the group "*Q. rubra*, *Q. coccinea*, *Q. tinctoria* and *Q. palustris* constitutes a polymorphous species from which we separate extreme forms as a convenience in study."

**\*22 *Ulmus fulva*, Michx.**

There are two good-sized trees at "Arcadia" by Piscataquog river. They are to all appearance indigenous, but the proximity of old houses and abandoned farms renders their spontaneousness at least questionable. Until more trees are discovered it will not be entirely safe to claim the species as indigenous within our area.

**\*23 *Morus alba*, L.**

A plantation of these trees in Pelham still survives to bear witness that our ancestors were not entirely free from money-making schemes. It was made sixty or seventy years ago during the "silkworm" craze. Tradition says that more than one resident of the town sank his little fortune in a similar unprofitable venture. The trees still bear fruit, though but scantily, for lack of cultivation.

**\*24 *Potentilla tridentata*, Ait.**

On Hooksett "Pinnacle," a small rocky elevation eight miles above Manchester, there is a station of this species, which is usually found either at the seashore or on high mountains. The "Pinnacle" is a little way back from the Merrimack river bank, rising to the height of some two hundred feet, the eastern and southern sides being precipitous and mostly bare.

[See *Rhodora*, i., 90.]

**\*25 *Hudsonia ericoides*, L.**

There is an immense station of this species at Concord on the high sand bluffs east of Merrimack river. The principal station examined extends along the top and slope of the bluff for about 1500 feet from south to north. There is more on the next bluff northward and still more south of the highway below the principal station. The trees growing with it are mostly *Pinus rigida* and *resinosa*, *Betula populifolia* and *Quercus ilicifolia*; grasses — *Agrostis scabra*, *Deschampsia flexuosa*, *Danthonia spicata* and *Andropogon scoparius*; shrubs — *Kalmia angustifolia* and *Myrica asplenifolia*; smaller plants — *Comandra umbellata* and *Polygala polygama* and two or three species of *Antennaria*. The soil is dry and very nearly clear sand. There are no rocks in the vicinity.

[See also *Rhodora*, i, 213, 214.]

**\*26 *Epilobium strictum*, Muhl.**

Abundant at least as far north as Lake Winnepesaukee.

**\*27 *Nyssa sylvatica*, Marsh.**

The tupelo is much more abundant than is generally supposed. In the "rhododendron swamp" (see *Rhododendron maximum* below) there are very large old trees which the woodman's axe has willingly spared. Large trees may be recognized at a distance by the contour of the trunk, which has a columnar aspect, the diameter diminishing but slightly from base to summit. The trunk is usually bare for more than one-half its height and often appears as if broken off at the top. The bark is very thick and rough and is scamed and cross-seamed in a characteristic manner.

**\*28 *Rhododendron maximum*, L.**

A high, wet swamp, difficult of access, near the northwest corner of Manchester, has long been known as a station of the beautiful "rose bay." The plants are usually in flower about July 4th. The swamp having recently been denuded of its trees the rhododendrons have not flowered as well as formerly and after very cold winters the buds are mostly blighted. No success has attended the transplanting of individuals.

A matter worthy of note is the presence in this same locality of *Chamæcyparis sphaeroides* and *Chiogenia serpyllifolia*, not yet reported elsewhere in our area.

### \*29 Utricularia.

A boggy pond in Manchester affords the three species named. Besides these there has been found there a small species rooting in mud and bearing small bright yellow flowers. No specimens having yet been examined which were in good condition further collections and observations must be awaited before the plants can be referred to the proper species.

### \*30 Antennaria.

The attention of observers is called to this genus as affording a peculiarly interesting field of study. Besides the five species and the variety named there are doubtless several others in our area.

[See also *Rhodora*, i, 71 and 150.]

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## SUMMARY.

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Number of Families represented.....	115
Number of Genera represented.....	368
Number of Species.....	804
Number of Varieties.....	13
Total number of names,	<hr/> 817



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MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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**SECTION D.**  
**ORNITHOLOGY.**

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**OFFICERS FOR 1899.**

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MRS. F. W. BATCHELDER, *President.*  
MRS. JOHN C. BICKFORD, *Vice President.*  
MR. HERBERT E. RICHARDSON, *Secretary.*  
MR. GEORGE E. BURNHAM, *Treasurer.*

**EXECUTIVE COMMITTEE.**

MR. EDWARD H. FOGG,   MISS THEODORA RICHARDSON,  
DR. EDWARD H. CURRIER.

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## SECTION D—ORNITHOLOGY.

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This Section was organized February 15th, 1899, and admitted to the Institute January 17th, 1899.

It has for its objects the systematic study of the structure and life-history of birds in general and the observation, record and classification of the avifauna of Manchester and vicinity. Special subjects for investigation will be the distribution of species locally with relation to climatic, geologic and floral conditions, the habits of birds, their food in its relation to insect pests and thereby to agriculture, their songs and calls, their variations—in short, anything which may increase our knowledge of their life-histories and of the links which join them to the lower and the higher animals and to man.

Two important collateral branches of the work will be these: First, the collection of a local museum of ornithology; in which in the course of time all the species incident to the region shall be represented by mounted specimens and skins prepared according to the latest and most approved methods; second, the compilation of as full a list as possible of resident, migrant, visitant and accidental species. The list will of necessity be at first a modest one. The addition of supplements annually will render practicable at no distant date the publication of a list more nearly commensurate with our ambition and with the avian wealth of an exceptionally favored locality.

The situation of Manchester is favorable to variety in its fauna no less than in its flora. The overlapping of the Boreal and Alleghanian areas gives rise to a corresponding overlapping of the breeding ranges of various species of birds. In illustration and proof of this may be cited the fact that the breeding range of the wood thrush extends not less than twenty miles north and of the hermit thrush not less than twenty miles south of Manchester, and that the white-throated sparrow or peabody bird is a summer resident.

In order to systematize the results of observation a perpetual bird-calendar is kept by members specially appointed from time to time, who incorporate with their own observations those of all the other members. Field-days are held at the pleasure of the section. Two were held this year and proved to be equally enjoyable and profitable.

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## LECTURES.

A COURSE OF

SIX LECTURES BY MR. RALPH HOFFMANN,  
OF BOSTON, MASS.

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This course was tendered to members of the Institute by the Ornithological Section. The lectures already given have been well attended and listened to with marked and increasing interest. Mr. Hoffman possesses the happy faculty of imparting his own enthusiasm to others and of relating his personal experiences in a vivid and picturesque manner.

The following are the dates and subjects of the course :

October 20th, 1899. A Bird's Year.

November 19th, 1899. Thrushes, Chickadees and Wrens.

December 15th, 1899. Warblers and Vireos

January 12th, 1900. Swallows and Sparrows.

February 9th, 1900. Blackbirds, Flycatchers and Woodpeckers.

March 9th, 1900. Birds of Prey, Game Birds and Water Birds.

## REPORTS OF MEETINGS—1899.

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Wednesday evening, February 15th. A meeting was held in the section-room of the Institute for the purpose of organization. Mr. E. J. Burnham was chosen chairman, and Mrs. F. W. Batchelder, Secretary. After the adoption of by-laws, Mr. E. H. Fogg, Mrs. J. W. Fellows and Miss May W. Davis were appointed a committee to nominate officers. The report of the committee was accepted and the officers nominated were unanimously elected by ballot. (See list of officers, page 113.)

After the completion of business the members were addressed by Mr. E. J. Burnham, who offered valuable suggestions relating to the work of the Section. He pointed out the exceptional character of our locality by reason of the overlapping of the Boreal and Alleghanian faunal areas and the proximity of the isothermal line and belt which divide and are at the same time common to both.

Mr. E. H. Fogg gave an extremely interesting account of various occasions when he was successful in approaching a wood thrush's nest and feeding the mother bird. Adjourned to March 1st.

Wednesday evening, March 1st. Mr. Fogg, as chairman of the executive committee, made the following recommendations: That steps be taken towards the collection of a local museum of ornithology; that the Check-List of the American Ornithologists Union be adopted as the standard in nomenclature; that the systematic study of the structure and life history of birds be undertaken by the Section; that papers and talks be voluntary; that a perpetual record of birds be kept in an ornithological bulletin of the Section, and that to this end two members be appointed at each meeting whose duty it shall be to present at the following meeting special reports of birds observed in the interval; that

after the transaction of business the remainder of each session be devoted to the study of birds and the examination of specimens.

The report was accepted and the recommendations approved.

An hour of study followed under the leadership of Mr. Fogg, the subject being "The Parts of a Bird." Adjourned to March 15th.

Wednesday evening, March 15th. A stormy evening. After routine business adjourned to March 29th.

Wednesday evening, March 29th. The executive committee reported in favor of the *Auk* and *Bird Lore* as two of the ornithological periodicals to be recommended to the Council for subscription. Further time was asked and granted. The calendar was read by Mr. F. W. Batchelder. Reports concerning wild geese were made by Mr. Burnham, Mr. Fogg and Mr. Batchelder. [See Bird List, under Wild Goose.] Mr. Fogg led the Section in an hour's study of the characteristics of grebes, loons and auks. Adjourned to April 12th.

Wednesday evening, April 12th. The executive committee presented a complete report, adding the *Wilson Bulletin* and the *A. O. U. Check List* to the number of periodicals desired.

After the reading of the calendar Mr. Burnham gave a very suggestive talk on the "Muscles of Birds." An hour of study followed, led by Mr. Fogg, the subject being, the Orders of Land and Water Birds. Adjourned to April 26th.

Wednesday evening, April 26th. After routine business adjourned to May 10th.

Wednesday evening, May 10th. Routine business. A vote of thanks was extended to Mr. Fogg for his services in leading the field day excursion of April 30th. Adjourned to May 24th.

Wednesday evening, May 24th. Routine business. After the reading of the calendar Mr. Burnham entertained the Section with a talk on the language of birds, suggested by the cry of the

night-hawk. Mr. Batchelder followed with a talk on the songs of the wood, hermit, olive-backed and Wilson's thrushes, with illustrations and transcriptions on the blackboard.

A Tennessee warbler which had been found dead was presented by Miss Tuson. The species is very rare in this region and the specimen excited unusual interest. Adjourned to June 7th.

Wednesday evening, June 7th. Routine business. Adjourned to June 21st.

Wednesday evening, June 21st. Routine business. Adjourned to September 20th.

Wednesday evening, September 20th. Routine business. Mr. Batchelder was by vote of the Section appointed to take charge of the calendar and compare the local list up to January 1st, 1900, with Chapman's list in his "Birds of Eastern North America." The members engaged in a free discussion of plans for the coming winter's work. A course of lectures was suggested. Adjourned to October 4th.

Wednesday evening, October 4th. The executive committee reported the engagement of Mr. Ralph Hoffmann, of Belmont, Mass., to give a course of six lectures, one monthly, from October, 1899, to March, 1900.

The calendar was read by Mr. F. W. Batchelder, who reported the white-throated sparrow as a local summer resident. [See Bird List.] He also stated that the olive-backed thrush had been heard in full song on the 1st and 2d of June last. An incursion of red-breasted nuthatches in large numbers was reported as having taken place in August and September, and a discussion followed as to the cause of such an unusual occurrence, some attributing it to circumstances relating to the food supply, others to the exceptional coolness of the past summer.

The Section, led by Mr. Fogg, made a special study of the white-crowned sparrow, yellow-bellied sapsucker and Tennessee warbler, of which finely prepared specimens were exhibited.

Mr. W. E. Moore gave a detailed account of the birds seen by

him during his summer outing on the Piscataqua river north of Portsmouth. Adjourned to October 20th.

Friday evening, October 20th. Lecture by Mr. Ralph Hoffman. Subject, "A Bird's Year." Adjourned to November 1st.

Wednesday evening, November 1st. After routine business, attended lecture in the "Chandler Course," by Prof. Mendenhall. Adjourned to November 17th.

Friday evening, November 17th. Lecture by Mr. Ralph Hoffman. Subject, "Thrushes, Chickadees and Wrens." Adjourned to November 29th.

Wednesday evening, November 29th. Routine business. Mr. Fogg gave suggestions as to attracting birds to our homes, with very interesting personal reminiscences of his success in that line. Mr. Batchelder read a paper on "Bird Songs and Calls," giving blackboard musical illustrations. Adjourned to December 15th.

Friday evening, December 15th. Lecture by Mr. Ralph Hoffman. Subject, "Warblers and Vireos." Adjourned to December 27th.

Wednesday evening, December 27th. Annual meeting, the Vice President in the chair; Miss Susan Richardson, Secretary *pro tem*; records read and approved. Mr. Wm. E. Moore and Miss Hattie Tuttle having been appointed a nominating committee reported the following list:

MRS. F. W. BATCHELDER, *President*.  
MRS. J. C. BICKFORD, *Vice President*.  
MISS MAY W. DAVIS, *Secretary*.  
MISS THEODORA RICHARDSON, *Treasurer*.

EXECUTIVE COMMITTEE.

MR. EDWARD H. FOGG,      MRS. JOHN C. BICKFORD.  
MISS THEODORA RICHARDSON.

The report was accepted and the officers named were unanimously elected by ballot.

The annual report of the Secretary was read and approved. Miss Theodora Richardson read a paper on "The Feather Structure and Flight of Birds," illustrated by blackboard sketches. Personal observations were contributed by Mr. Fogg and Mr. Moore, and the flight of birds was discussed. Adjourned to January 12th, 1900.

## INTRODUCTION TO LIST.

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With the exception of the few changes authorized by the Eighth and Ninth Supplements to the Check List of the American Ornithologists' Union the nomenclature employed in this list is identical with that in Chapman's Hand-book of the Birds of Eastern North America, third edition. In the preparation of the notes the compilers have taken the utmost care to incorporate nothing which was of doubtful authenticity or which might be the result of insufficient observation. The poverty of the list in items relating to the habits and life history of many of the species named should be attributed to the fact that but a short time has elapsed since systematic observations were inaugurated. It is hoped that these records, meeting the eyes of persons interested, may be instrumental in bringing in reports from other localities in our area which is, broadly speaking, central southern New Hampshire, embracing the whole of Hillsborough County, the west half of Rockingham County and the south half of Merrimack County. All properly authenticated reports will be incorporated with the supplementary lists to be published annually hereafter in the Proceedings of the Institute.

Communications addressed to E. J. Burnham, Corresponding Secretary of the Institute, Manchester, N. H., will receive due consideration.

PRELIMINARY LIST  
OF BIRDS

RESIDENT, VISITANT, MIGRANT OR ACCIDENTAL, OBSERVED IN  
THE VICINITY OF MANCHESTER, N. H.

COMPILED BY

FREDERICK W. BATCHELDER,

ASSISTED BY

EDWARD H. FOGG.

1899.

**7. *Gavia imber* (*Gunn.*)** LOON.

Formerly an abundant summer resident, breeding about our lakes and larger ponds; now scarce south of Lake Winnepesaukee.

**106. *Oceanodroma leucorhoa* (*Vicill.*)** LEACH'S PETREL.

A stray individual was shot near the mill-dam at Lake Massabesic, in Manchester, October 4th, 1899.

**129. *Merganser americanus* (*Cass.*)** AMERICAN MERGANSER. SHELDRAKE.

A transient visitant, mostly in November and December. Possibly a few winter. A very large flock was seen in the Merrimack river, about two miles below Nashua, December 2d, 1899.

**133. *Anas obscura* (*Gmel.*)** BLACK DUCK.

A summer resident, now becoming very scarce.

**144. *Aix sponsa* (*Linn.*)** WOOD DUCK.

A summer resident, also becoming very scarce. Reported recently from Pelham and Concord.

**172. *Branta canadensis* (Linn.)** WILD GOOSE.

Spring and fall migrant.

The rapidity of flight attained by the wild geese in their migrations is very remarkable, as the following incident may serve to show. On the 12th of March, 1898, an observer who was on board an express train between Nashua and Manchester, where the road runs along the west bank of the Merrimack river, saw a large flock rise from the water a little way ahead of the train. The main part of the flock went off in a northeasterly direction, apparently towards Lake Massabesic, and soon disappeared. The remainder of the flock, comprising seven individuals, the leader of which was noticeably larger than his companions, kept on straight up the river at a rather low altitude, maintaining the familiar harrow-shaped form in their arrangement. From Reed's Ferry to Goffe's Falls, a distance of four miles, they kept up with the train so exactly that in relation to it they appeared absolutely motionless. At the latter place, where the train crossed the river, the birds were lost sight of. On making inquiries of the trainmen as to the rate of speed attained it was found that it had not been less than forty-five miles an hour, probably more. During the race the birds appeared to fly with ease as if making no unusual effort.

At Manchester on several occasions flocks have been observed during foggy nights to fly to and fro across the city, making a great noise, as if bewildered and trying to get their bearings. In the spring of 1899 a flock approaching the city from the westward was seen suddenly to swerve to the southward, as if to avoid the smoke of the manufacturing district, for as soon as it had passed beyond it another sudden turn was made and the flock again took a straight easterly course till out of sight.

**190. *Botaurus lentiginosus* (Montag.)** AMERICAN BITTERN. STAKEDRIVER.

Fairly common summer resident. Almost always called the "Stakedriver."

**194. *Ardea herodias* (Linn.)** GREAT BLUE HERON.

Very rare summer resident. One was shot near Dorr's pond in Manchester, in the summer of 1899. These beautiful birds not being protected by law, any man who can "hit a barn door" is privileged to blaze away at them at long or short range, and the great blue heron will soon be as extinct as the dodo, so far as our area is concerned.

**201. *Ardea virescens* (Linn.)** LITTLE GREEN HERON.

Common summer resident.

**228. *Philohela minor* (Gmel.)** AMERICAN WOODCOCK.

Common summer resident.

**242. *Tringa minutilla* (Vieill.)**

LEAST SANDPIPER. PEEP.

Transient visitant in late spring and late summer. Observations recorded at Manchester June 3d and July 10th, 1898, and May 27th, 1889. May it not possibly be a rare summer resident?

**254. *Totanus melanoleucus* (Gmel.)**

GREATER YELLOW-LEGS.

Transient visitant, rarely seen. Recorded August 27th, 1896.

**255. *Totanus flavipes* (Gmel.)** SUMMER YELLOW-LEGS.

Rare transient visitant.

**256. *Totanus solitarius* (Wils.)** SOLITARY SANDPIPER.

Transient visitant. Observations recorded at Manchester September 6th, 1898; July 17th, 1899. May it not possibly, like *T. minutilla*, be a rare summer resident?

**263. *Actitis macularia* (Linn.)** SPOTTED SANDPIPER.

Common summer resident.

**289. *Colinus virginianus* (Linn.)** QUAIL. BOB-WHITE.

Common permanent resident.

**300. *Bonasa umbellus* (Linn.)**

RUFFED GROUSE. PARTRIDGE.

Common permanent resident.

**315. *Ectopistes migratorius* (Linn.)**

PASSENGER PIGEON,

Rare and irregular transient visitant. Reported from Concord.

**316. *Zenaidura macroura* (Linn.)** MOURNING DOVE.

Occasional in summer.

**331. *Circus hudsonius* (Linn.)**

MARSH HAWK.

Not common summer resident.

**332. *Accipiter velox* (Wils.) SHARP-SHINNED HAWK.**

Common summer resident; occasional winter visitant.

**333. *Accipiter cooperi* (Bonap.) COOPER'S HAWK.**

Common summer resident.

**334. *Accipiter atricapillus* (Wils.) GOSHAWK.**

Irregular summer resident.

**337. *Buteo borealis* (Gmel.) RED-TAILED HAWK.**

Not common summer resident.

**339. *Buteo lineatus* (Gmel.) RED-SHOULDERED HAWK.**

Common permanent resident.

**352. *Haliaëtus leucocephalus* (Linn.) BALD EAGLE.**

Permanent resident, but becoming scarce south of Lake Winnepesaukee.

The bald eagle is occasionally seen in the vicinity of lakes and streams throughout our area, especially along the Merrimack river. It is known to breed as far south as Franklin. While it is highly probable that it nests farther south in the more secluded and mountainous districts of Hillsborough county authentic reports to that effect are lacking. Birds which have been reported by inexperienced observers as "large hawks" have sometimes on investigation turned out to be eagles. In fact, the eagle, while not common in our area, is not so rare as is popularly imagined and there is much to learn in regard to its distribution and annual movements.

**357. *Falco columbarius* (Linn.) PIGEON HAWK.**

Common summer resident.

**360. *Falco sparverius* (Linn.) AMERICAN SPARROW HAWK.**

Rather common summer resident.

**364. *Pandion haliaëtus carolinensis* (Gmel.) AMERICAN OSPREY. FISH HAWK.**

Common summer resident.

**372. *Nyctala acadica* (Gmel.)**

SAW-WHET OWL. ACADIAN OWL.

Occasional winter visitant.

**373. *Megascops asio* (Linn.)**

SCREECH OWL.

Uncommon permanent resident.

**387. *Coccyzus americanus* (Linn.)**

YELLOW-BILLED CUCKOO.

Rare summer resident.

**388. *Coccyzus erythrophthalmus*, (Wils.)**

BLACK-BILLED CUCKOO.

Common summer resident.

**390. *Ceryle alcyon* (Lynn.)**

BELTED KINGFISHER.

Common summer resident.

**393. *Dryobates villosus* (Linn.)**

HAIRY WOODPECKER.

Common permanent resident.

**394c. *Dryobates pubescens medianus* (Swains.)**

DOWNY WOODPECKER.

Common permanent resident.

**402. *Sphyrapicus varius* (Linn.)**

YELLOW-BELLIED WOODPECKER. SAPSUCKER.

Common transient visitant.

**405a. *Ceophloeus pileatus abieticola* (Bangs.)**

NORTHERN PILEATED WOODPECKER.

Reported from Concord.

**406. *Melanerpes erythrocephalus* (Linn.)**

RED-HEADED WOODPECKER.

Very rare occasional visitant. Recorded at Manchester, May 28th, 1899. Also reported from Londonderry.

**412a. *Colaptes auratus luteus* (Bangs.)**

GOLDEN-WINGED WOODPECKER. NORTHERN FLICKER.

Common summer resident.

**417. *Antrostomus vociferus* (Wils.)** WHIP-POOR-WILL.

Common summer resident.

**420. *Chordeiles virginianus* (Gmel.)** NIGHTHAWK.

Common summer resident.

**423. *Chaetura pelagica* (Linn.)**

CHIMNEY SWIFT. CHIMNEY "SWALLOW."

Common summer resident.

**428. *Trochilus colubris* (Linn.)**

RUBY-THROATED HUMMING BIRD.

Common summer resident.

**444. *Tyrannus tyrannus* (Linn.)**

KINGBIRD.

Common summer resident.

**452. *Myriarchus crinitus* (Linn.)**

GREAT CRESTED FLYCATCHER.

Uncommon summer resident.

**456. *Sayornis phoebe* (Lath.)**

PHOEBE.

Common summer resident.

**459. *Contopus borealis* (Swains.)**

OLIVE-SIDED FLYCATCHER.

Not uncommon summer resident.

**461. *Contopus virens* (Linn.)**

WOOD PEWEE.

Common summer resident.

**463. *Empidonax flaviventris* (Baird.)**

YELLOW-BELLIED FLYCATCHER.

Uncommon transient visitant. Recorded at Manchester, August 30th, 1899.

- 467. *Empidonax minimus* (Baird.)**  
LEAST FLYCATCHER. CHEBEC.  
Common summer resident.
- 474. *Otocoris alpestris* (Linn.)**                      HORNED LARK.  
Very rare winter visitant.
- 477. *Cyanocitta cristata* (Linn.)**                      BLUE JAY.  
Common permanent resident.
- 488. *Corvus americanus* (Aud.)**                      AMERICAN CROW.  
Common permanent resident.
- 494. *Dolichonyx oryzivorus* (Linn.)**                      BOBOLINK.  
Common summer resident.
- 495. *Molothrus ater* (Bodd.)**                      COWBIRD.  
Common summer resident.
- 498. *Agelaius phoeniceus* (Linn.)**  
RED-WINGED BLACKBIRD.  
Common summer resident.
- 501. *Sturnella magna* (Linn.)**                      MEADOW LARK.  
Common summer resident.
- 507. *Icterus galbula* (Linn.)**                      BALTIMORE ORIOLE.  
Common summer resident.
- 509. *Scolecophagus carolinus* (Müll.)**  
RUSTY BLACKBIRD.  
Transient visitant.
- 511b. *Quiscalus quiscula æneus* (Ridgw.)**  
BRONZED GRACKLE. CROW BLACKBIRD.  
Rare transient visitant.

**515. *Pinicola enucleator canadensis* (Cab.)**

PINE GROSBEEK.

Irregular winter visitant. Very numerous in January and February, 1896.

**517. *Carpodacus purpureus* (Gmel.)**

PURPLE FINCH. LINNET.

Common summer resident.

**— *Passer domesticus* (Linn.)**

HOUSE SPARROW. ENGLISH SPARROW.

Very common permanent resident.

**521. *Loxia curvirostra minor* (Brehm.)**

AMERICAN CROSSBILL. RED CROSSBILL.

Irregular winter visitant.

**522. *Loxia leucoptera* (Gmel.)**

WHITE-WINGED CROSSBILL.

Irregular and rare winter visitant. Recorded at Manchester, October 16th, 1899, and observed frequently during the remainder of the year. Reports from other sections of New England indicate an incursion in unusually large numbers of these rare birds during the winter of 1899-1900.

**528. *Acanthis linaria* (Linn.)**

REDPOLL LINNET.

Rather common winter visitant.

**529. *Astragalinus tristis* (Linn.)**

AMERICAN GOLDFINCH. THISTLE BIRD.

Permanent resident, less common in winter.

**534. *Passerina nivalis* (Linn.)**

SNOW BUNTING. SNOW BIRD.

Winter visitant, not often abundant. Contrary to the opinion of some ornithological writers these birds do frequently alight in trees.

**540. *Poecetes gramineus* (Gmel.)**

BAY-WINGED BUNTING. GRASS FINCH. VESPER SPARROW.

Common summer resident.

**554. *Zonotrichia leucophrys* (Forst.)**

WHITE-CROWNED SPARROW.

Transient visitant, occasionally abundant. Earliest spring arrivals recorded at Manchester, May 6th, 1896; average date, 1896 to 1899, May 9th. The birds are occasionally heard in full song about the 13th of May. The song is brilliant and sweet, somewhat resembling that of the vesper sparrow but wilder. The usual notes, given at intervals while the birds are feeding, are a plaintive imitation of the white throat's notes, the first phrase like "*Oh-dear-me*," uttered very slowly with a rising inflection; the second, after a long pause, "*fee-pew-pew*," also very slowly, but with a falling inflection.

**558. *Zonotrichia albicollis* (Gmel.)**

WHITE-THROATED SPARROW. PEABODY BIRD.

Common transient visitant; also not common summer resident.

The fact that this species, formerly supposed to be only a transient visitant, is also a summer resident, at least in the vicinity of Manchester, has been verified beyond question. Nests and eggs have been found in Bedford by Mr. Louis H. Rundlett, now superintendent of schools in Concord, and on Oak hill in Manchester by Mr. George Bisco and the late Mr. William W. Colburn, and the characteristic song has been heard for several successive summers on the plains in the vicinity of Goffe's Falls.

**559. *Spizella monticola* (Gmel.)**

TREE SPARROW.

Common transient visitant in spring and fall. Less common winter visitant.

**560. *Spizella socialis* (Wils.)**

CHIPPING SPARROW.

Common summer resident.

**563. *Spizella pusilla* (Wils.)**

FIELD SPARROW.

Common summer resident.

**567. *Junco hyemalis* (Linn.)**

JUNCO. SLATE-COLORED SNOWBIRD.

Common transient visitant in spring and fall; rare winter visitant.

**581. *Melospiza fasciata* (Gmel.)**

SONG SPARROW.

Very common summer resident.

**584. *Melospiza georgiana* (Lath.)**

SWAMP SPARROW.

Not uncommon summer resident.

**585. *Passerella iliaca* (Merr.)** FOX SPARROW.

Common transient visitant.

**587. *Pipilo erythrophthalmus* (Linn.)**  
TOWHEE BUNTING. CHEWINK.

Common summer resident.

**595. *Zamelodia ludoviciana* (Linn.)**  
ROSE-BREADED GROSBEAK.

Common summer resident.

**598. *Cyanospiza cyanea* (Linn.)** INDIGO BIRD.

Common summer resident.

**608. *Piranga erythromelas* (Vicill.)**  
SCARLET TANAGER.

Common summer resident, and becoming more abundant since protected by law.

**611. *Progne subis* (Linn.)** PURPLE MARTIN.

Less common than formerly but locally abundant.

**612. *Petrochelidon lunifrons* (Say.)** EAVE SWALLOW.

Not common summer resident, of very irregular distribution.

**613. *Hirundo erythrogaster* (Bodd.)** BARN SWALLOW.

Common summer resident.

**614. *Trachycineta bicolor* (Vicill.)**  
WHITE-BELLIED SWALLOW. TREE SWALLOW.

Not common summer resident.

**616. *Clivicola riparia* (Linn.)** BANK SWALLOW.

Common summer resident.

**618. *Ampelis garrulus* (Linn.)** BOHEMIAN WAXWING.

Rare and irregular winter visitant. Recorded for the winter of 1897-8.

**619. *Ampelis cedrorum* ( *Vicill.* )**

CEDAR WAXWING. CEDAR BIRD.

Permanent resident, not common in winter.

**621. *Lanius borealis* ( *Vicill.* )** SHRIKE. BUTCHER BIRD.

Common winter visitant — not rare in spring and fall.

**624. *Vireo olivaceus* ( *Linn.* )** RED-EYED VIREO.

Common summer resident.

**627. *Vireo gilvus* ( *Vicill.* )** WARBLING VIREO.

Common summer resident — especially abundant in the cities and villages.

**628. *Vireo flavifrons* ( *Vicill.* )**

YELLOW-THROATED VIREO.

Common summer resident; also, like the last, abundant in the cities and villages.

**629. *Vireo solitarius* ( *Wils.* )**

BLUE-HEADED VIREO. SOLITARY VIREO.

Transient visitant in spring and fall — perhaps a rare summer resident.

**631. *Vireo noveboracensis* ( *Gmel.* )**

WHITE-EYED VIREO.

Rare summer resident. A pair nested near Lake Massabesic, Manchester, in 1899. A nest had previously been found on the Hooksett road in Manchester.

**636. *Mniotilta varia* ( *Linn.* )**

BLACK AND WHITE WARBLER. BLACK AND WHITE CREEPER.

Common summer resident.

**647. *Helminthophila peregrina* ( *Wils.* )**

TENNESSEE WARBLER.

Rare transient visitant.

**648a. *Compsothlypis americana usneæ* ( *Brewster.* )**NORTHERN PARULA WARBLER. BLUE YELLOW-BACKED  
WARBLER.

Common transient visitant; a few breed.

**652. *Dendroica aestiva* (Gmel.)**      YELLOW WARBLER.

Very common summer resident.

**654. *Dendroica caerulescens* (Gmel.)**

BLACK-THROATED BLUE WARBLER.

Rare transient visitant.

**655. *Dendroica coronata* (Linn.)**

YELLOW-RUMPED WARBLER.   MYRTLE WARBLER.

Common transient visitant.

**657. *Dendroica maculosa* (Gmel.)**

MAGNOLIA WARBLER.   BLACK AND YELLOW WARBLER.

Rare transient visitant.

**659. *Dendroica pennsylvanica* (Linn.)**

CHESTNUT-SIDED WARBLER.

Common summer resident.

**660. *Dendroica castanea* (Wils.)**

BAY-BREASTED WARBLER.

Transient visitant.

**661. *Dendroica striata* (Forst.)**   BLACK-POLL WARBLER.

Common transient visitant.

**662. *Dendroica blackburniæ* (Gmel.)**

BLACKBURNIAN WARBLER.

Rare transient visitant.

**667. *Dendroica virens* (Gmel.)**

BLACK-THROATED GREEN WARBLER.

Common summer resident.

**671. *Dendroica vigorsii* (Aud.)**

PINE WARBLER.

Common summer resident.

- 672a. *Dendroica palmarum hypochrysea* (Ridgw.)**  
YELLOW PALM WARBLER. YELLOW REDPOLL.

Common transient visitant.

- 674. *Seiurus aurocapillus* (Linn.)**  
OVEN BIRD. GOLDEN-CROWNED THRUSH.

Common summer resident.

- 675. *Seiurus noveboracensis* (Gmel.)**  
WATER THRUSH.

Not common summer resident.

- 681. *Geothlypis trichas* (Linn.)**  
MARYLAND YELLOW-THROAT.

Common summer resident.

- 685. *Wilsonia pusilla* (Wils.)**  
WILSON'S WARBLER. BLACK-CAP WARBLER.

Rare transient visitant.

- 686. *Wilsonia canadensis* (Linn.)**  
CANADIAN WARBLER.

Not rare transient visitant.

- 687. *Setophaga ruticilla* (Linn.)**  
AMERICAN REDSTART.

Common summer resident.

- 704. *Galeoscoptes carolinensis* (Linn.)** CATBIRD.

Common summer resident.

- 705. *Harporhynchus rufus* (Linn.)**  
BROWN THRASHER. BROWN THRUSH.

Common summer resident.

- 721. *Troglodytes aëdon* (Vieill.)** HOUSE WREN.

Very rare summer resident.

**724. *Cistothorus stellaris* (*Licht.*)**

SHORT-BILLED MARSH WREN.

Very rare summer resident. Nest found at Manchester in Cohas brook meadows, 1899.

**726. *Certhia familiaris fusca* (*Barton.*)**

BROWN CREEPER.

Common winter resident.

**727. *Sitta carolinensis* (*Lath.*)**

WHITE-BREASTED NUTHATCH.

Common permanent resident.

**728. *Sitta canadensis* (*Linn.*)**

RED-BREASTED NUTHATCH.

Common transient visitant, occasional in winter. Numerous flocks were seen in August and September, 1899; an unusual occurrence.

**735. *Parus atricapillus* (*Linn.*)**

CHICADEE.

Common permanent resident.

**748. *Regulus satrapa* (*Licht.*)**

GOLDEN-CROWNED KINGLET.

Not common transient visitant in late fall and early spring.

**749. *Regulus calendula* (*Linn.*)**

RUBY-CROWNED KINGLET.

Common transient visitant.

**755. *Hylocichla mustelina* (*Gmel.*)**

WOOD THRUSH.

Common summer resident.

The opinion of ornithological writers and lecturers that the southern boundary line of New Hampshire constitutes an impassable barrier to the further northward migration of the wood thrush is proved by observation to be erroneous. The species is abundant in the Merrimack valley at least as far north as Concord and there is little doubt that individuals may be found still further north. At Manchester the wood thrush appears to exceed the hermit thrush in numbers, while at Concord the latter exceeds the former. Other considerations than those of latitude evidently control the relative distribution of the two species. For example,

at Pelham on the Massachusets line the hermits outnumber the wood thrushes, while at Manchester, twenty miles further north, the latter, as noted above, are the more numerous. It is stated on good authority that at Dover, which is in the same latitude as Concord, the wood thrush is unknown. The species has been reported from Lake Winnepesaukee, but as yet without sufficient verification. Studies of the distribution of the wood thrush in southern and central New Hampshire will well repay those who shall undertake them.

**756. *Hylocichla fuscescens* (Steph.)**

WILSON'S THRUSH. VEERY.

Common summer resident.

**758a. *Hylocichla ustulata swainsoni* (Cab.)**

OLIVE-BACKED THRUSH.

Common transient visitant.

Very abundant in the spring and fall migrations, arriving at Manchester about May 16th, a week after the wood thrush, and tarrying till about June 4th. In 1899 a pair took up their temporary residence for more than two weeks in a city garden well supplied with closely trimmed evergreens. During the last two days, June 1st and 2d, the male was in full song. The song is described as being rich, full and very sweet, with a penetrating, vibrant quality, and in form very like the first six notes of Handel's air, "*O had I Jubal's lyre.*" It is suspected that the species may breed not far to the northward of Manchester, possibly in the immediate vicinity.

**759b. *Hylocichla aonalaschkæ pallasii* (Cab.)**

HERMIT THRUSH.

Common summer resident.

This species, as noted above under "Wood Thrush," (q. v.) is irregularly distributed over our area with little apparent relation to latitude. The hermit thrush being abundant in some of the southern towns and the wood thrush being not rare as far north as Concord it is evident that the southerly range of the former and the northerly range of the latter overlap at least forty miles in the vicinity of the Merrimack valley. The earliest spring arrivals usually appear between the 14th and 16th of April, though individuals have been recorded as early as the 4th. The males are sometimes in full song by the 23d.

As migrants the hermits far outnumber the other thrushes, being especially numerous in fall, when they visit cultivated fields and gardens and mingle freely with birds of other species, even with the despised house sparrows. They are very friendly with the robins, as if recognizing their close relationship. With the sparrows they are on their dignity, driving them off with a considerable show of spitefulness when they become too numerous for comfort. After November 1st they rapidly diminish and soon disappear.

**761. *Merula migratoria* (Linn.)** AMERICAN ROBIN.

Very common summer resident; a few winter.

**766. *Sialia sialis* (Linn.)** BLUEBIRD.

Common summer resident.

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MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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**SECTION E.**  
**FINE ARTS.**

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**OFFICERS FOR 1898-1899.**

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EDWARD J. BURNHAM, *President.*  
WILLIS B. KENDALL, *Treasurer.*  
WILLIAM E. BUCK, *Auditor.*  
WILLIAM H. HUSE, *Clerk.*

**DIRECTORS.**

HENRY W. HERRICK,	LUTHER C. BALDWIN,
JOEL DANIELS,	WILLIAM E. BUCK,
NORWIN S. BEAN,	J. BRODIE SMITH,
W. R. CALL,	WILLIAM K. ROBBINS.

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## SECTION E—FINE ARTS.

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• In September, 1871, an organization of amateur and professional artists was formed and assumed the name of the Manchester Art Association. The purpose of the association was mutual instruction in the principles of art. A class was soon formed for drawing from life, the study of text books on art, and lectures on art principles. During the second year of its existence the association secured rooms in the Court House and fitted them for its use. It soon accumulated a goodly collection of casts, models, pictures and books.

In 1874 steps were taken to incorporate the association. A committee was appointed to draft articles of association, and on October 13th of this year the articles as prepared by the committee were adopted, and the association became a corporation. For a number of years the association occupied its rooms in the Court House, the use of the rooms being donated by the city. In 1893 the association was notified that the city needed the rooms for uses of its own and a room was secured in the Pickering block at an expense that proved a severe burden to the treasury of the association. This burden was successfully carried for years by the voluntary subscriptions of enthusiastic members, but in time became too great to be borne by one association alone.

At a meeting of the association, held February 9th, 1899, the recommendation of the directors that the association apply for admission as a Section of the Manchester Institute of Arts and Sciences was adopted, and the clerk was instructed to make application for such admission. By vote of the council of the Institute the Art Association was admitted and designated as "Section E—Fine Arts."

The Manchester Art Association has had an honorable history. From the time of its incorporation till its union with the Institute, the office of President has been filled by the following honored citizens of this city: Mr. Henry W. Herrick, the able and distinguished water color artist; Dr. E. M. Tubbs; Mr. George

W. Stevens, the skillful architect and civil engineer; Ex-Governor Moody Currier, and Edward J. Burnham, editor of the Manchester Union.

For a number of years the association has each year held an exhibition of works of art. These exhibitions have been successfully managed and largely attended by the citizens of Manchester.

The art collection belonging to the association includes casts from the antique, prints and photographs of famous paintings and a complete collection of the works of John Rogers. The library of the association comprises nearly seven hundred books and pamphlets on art and kindred subjects.

At the annual meeting of the Manchester Art Association, October 11th, 1898, the following officers were elected. (See list, page 139.)

Upon becoming a Section of the Manchester Institute of Arts and Sciences the Art Association moved its property to the rooms of the Institute and its treasury was at once relieved of the heavy burden of rent under which it had been struggling. The past year has been one of the most prosperous since the early years of its existence, when the enthusiasm of the members of the young organization kept it upon the high tide of popularity and prosperity.

The following entertainment and lecture course was given under the auspices of the association during the winter of 1898-9:

December 15th, 1898. J. Brodie Smith, "Kinetoscope Exhibition."

January 7th, 1899. Caryl D. Haskins, "The Coast Defences in Our Late War." Illustrated.

January 26th. Albert L. Clough, "The Automobile, the Vehicle of the Future." Illustrated.

February 16th. Clarence Bancroft, "An Oriental Journey." Illustrated.

March 2d. Edward J. Burnham, "Some facts in Natural History." Illustrated.

March 16th. William K. Robbins, "The Chemistry of Food."

At a special meeting held April 13th, 1899, Mrs. John B. Varick exhibited a large number of skillfully executed wood carvings, specimens of her ability in that art.

At the same meeting announcement was made of two art classes to be formed under the instruction of Prof. J. Warren Thyng, supervisor of drawing in the public schools, and Mr. Wm. E. Burbank. Beginning the same week as the meeting when the announcement was made and lasting till July Mr. Burbank met his class on every Thursday evening for work in drawing from the antique, and Prof. Thyng lectured before his class upon perspective and composition. These classes were free to members of the Institute and were largely attended.

Messrs. Burbank and Thyng began their classes again in the fall and have at times had so large an attendance as to tax the accommodations of the rooms. At the annual meeting of Section E, held October 10th, 1899, the following officers were elected for the ensuing year :

WILLIAM H. HUSE, *President.*  
 WILLIS B. KENDALL, *Treasurer.*  
 WILLIAM E. BUCK, *Auditor.*  
 MISS EVA F. TUSON, *Clerk.*

## DIRECTORS.

HENRY W. HERRICK,	WILLIAM E. BUCK,
NORWIN S. BEAN,	J. BRODIE SMITH,
W. R. CALL,	WILLIAM K. ROBBINS,
LUTHER C. BALDWIN,	CHARLES H. BARTLETT.

The following gentlemen have served as President of the Manchester Art Association in the order named : Henry W. Herrick, three years ; Edward M. Tubbs, six months ; George W. Stevens, three and one-half years ; Henry W. Herrick, two years ; Moody Currier, fourteen years ; Edward J. Burnham, one year.



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MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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**SECTION F.**  
**MINERALOGY AND GEOLOGY.**

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**OFFICERS FOR 1899.**

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GEORGE WINCH, *President.*  
MISS SUSIE C. FOGG, *Vice President.*  
WILLIAM H. HUSE, *Secretary.*  
MISS SARA HUNT, *Treasurer.*

**EXECUTIVE COMMITTEE.**

HERBERT E. RICHARDSON,    CHARLES J. ABBOTT.

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## SECTION F—MINERALOGY AND GEOLOGY.

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On the evening of June 7th, 1899, a number of members of the Institute met at the rooms for the purpose of organizing a Section of mineralogy. The meeting was called to order by W. H. Huse. E. J. Burnham was elected temporary chairman and Geo. Winch temporary clerk.

After informal remarks by several present, upon motion it was voted that a Section be organized and that it be known as the Section of "Mineralogy and Geology."

Upon motion it was voted that a committee be appointed to recommend a constitution and by-laws. The committee appointed consisted of Messrs. G. I. Hopkins, C. J. Abbott, W. H. Huse and E. J. Burnham. This committee reported a short constitution and by-laws which were adopted.

Upon motion it was voted to ballot for officers. The following were elected to serve till the annual meeting in December. (See list, page 145.)

Upon motion the Secretary was instructed to apply to the council for recognition as a Section in the Institute.

June 28th, 1899. The President in the chair. Mr. E. P. Richardson was introduced and gave a very interesting talk upon some of the minerals to be found in this vicinity. He said in part :

"Granite exists in numerous ledges and in erratic or drift boulders scattered over this vicinity. Although but little attention is paid to the quarrying at present, still some specimens are of fine and desirable character. At the old Clark ledge, just south of Stark park, may be found very fine specimens of a soda feldspar known as albite. It is of a pure white color and often associated with granite, carrying minute red garnets, also very good specimens of black tourmaline crystals. Very good specimens of black mica or biotite abound in the same locality. On the whole it is an interesting place for the student to visit.

Of feldspar, very fine specimens of orthoclase, the flesh red, are abundant at the city ledge near the poor farm. I have secured some fine crystals, though not abundantly. This orthoclase is rich in potash. Dana gives in his analysis 16.9 parts in the 100. It appears to me that if pulverized it might be a valuable fertilizer and a great benefit to our worn-out lands. The varieties of feldspar are so numerous in this vicinity that it is needless to particularize localities.

I will call attention also to the numerous detached boulders of porphyritic gneiss that may be observed existing in great abundance all over this locality. They are erratic rocks that have been brought here from the vicinity of Winnepesaukee and Sunapee lakes, where the rock occurs in the vast ledges of those localities. They were transported here in the ice drift of the great glacial age, many of them retaining the polished or streaked appearance which they received in their transit. You will readily recognize them. In form they are usually rounded, the color of the rock mass being usually greyish, sometimes black. Interspersed in the mass you will find numerous crystals of a white or lightish feldspar. These crystals measure from a quarter to two or three inches in length. The gneissoid rocks are very abundant in all sections of the city, particularly in the neighborhood of the Manton brook, south of the city reservoir, where the rock is of a pinkish or flesh color and impregnated with streaks of biotite. Most of the rock formations around Massabesic pond are of gneiss. This rock belongs to the class of granites, but is distinguished in having the mica deposited in streaks or veins instead in a homogeneous mass, like true granite.

I must not overlook the crystals of magnetite, a form of iron, occasionally found in the old wall stones in this vicinity, notably in the neighborhood of the city farm. I judge that they also came in the ice drift from the north, from the fact that I have not observed them in the bed rocks about here. Near the junction of Milton and Merrimack streets may be observed, opposite A. H. Paige's house, and directly in the street, the cropping out of a granite ledge with an extensive seam of (amphibolyte) hornblende of the variety Actinolite having slender light green crystals. It is in massive form and easily accessible with proper tools.

Right here is also found a very fine dyke of trap carrying beautiful masses of crystals. David Perkins has secured many fine specimens here and will doubtless be pleased to direct you to the vein. Very good specimens of the red feldspar abound in the same place. Extensive veins of hornblende and chloritic schists were exposed at the recent improvements on the Boston and Maine railroad near the brewery. At the Amoskeag Falls trap veins can be seen, but the best specimens of this material I obtained in 'Squog near the old church on South Main street. The vein was struck while excavating for the city sewer. This vein was of a very dark, nearly black color, with beautiful crystals of augite in various shades of green olivine. The vein was very compact and difficult to work. Trap rock also occurs very abundantly in detached masses or boulders, probably drift rocks, all through this section. I am informed that at a ledge just north of St. Joseph's cemetery good specimens of mica crystals of the variety known as phlogopite are to be found. These crystals are very beautiful and will repay well the labor of procuring them. I hope some of you may visit the locality and report upon it later.

Our most common rock is the coarse feldspathic granite so much used for foundation stone for buildings. A good example may be seen at the Amoskeag Company's ledge, a little south from Rock Rimmon. The above includes most of our local varieties. But we have an endless variety of other rock occurring in kames of the river valleys and also in the numerous glacial beds of drift. I have found conglomerates that probably come from the vicinity of Lisbon, also specimens of the red porphyritic rock from the flanks of Mt. Lafayette, also fragments of labradorite and other varieties of erratic rocks in great abundance here. In the neighboring town of Bedford good specimens of graphite have been found, generally in small detached boulders. There are no deposits there in mass. A few specimens of epidote and black tourmaline have been found there.

In the town of Amherst, adjoining Bedford, at the place called Joppa, some years ago Dr. Jackson, a distinguished geologist, while engaged in the state survey, opened a pit from which a small quantity of good lime was obtained, but the expense of

working caused it to be abandoned. I found here very fine specimens of common garnets. The locality is accessible from the highway and will repay a visit of the student. At the Frances-town soapstone quarries I found besides the steatite some good specimens of serpentine, also of coarse asbestos, and hornblende and seams containing calcite.

At Hooksett, at the Pinnacle, lead ore carrying silver, also small deposits, or grains, of gold have been obtained. I have seen small beads of them in possession of the late B. P. Cilley here; also good specimens of quartz crystals are to be found. There is a vein of white quartz running out towards Allenstown. Some specimens are very interesting, being traversed with numerous veins of red. You cannot fail to observe this rock, for the old walls along the highways are full of it; many of the blocks are covered with minute crystals. At the Devil's Den in Auburn excellent specimens of folded mica schist occur, also good samples of gneiss.

Portsmouth and York, so accessible and so extensively frequented by Manchester people for their summer outings, I have found to be a geologist's or mineralogist's paradise, and if I refer briefly to the locality, I trust I may be able to furnish you with an additional pleasure in the contemplation of the rock masses of that section. Here are to be found immense beds of shale that have been upturned and fractured in the grandest scale. Into the seams have been ejected masses of lava or trap of various colors and character, here a bed of porphyritic variety, and there a dike of the amygdaloid, and numerous other varieties, all of a most interesting character. Flanking these trap dikes are walls of metamorphic shales and slates, the striped stone that York Beach pebbles are formed from, also here are to be found fine specimens of breccia and numerous and extensive beds of syenite and numerous other interesting varieties. The student will be richly rewarded by a visit here, and with strong limbs, sharp eyes and his tool bag, may reap a rich harvest. In the vicinity of Portsmouth I find fine specimens of shale, and in the seams of the stone occur numerous veins of quartz and calcite or carbonate of lime. The series belong to one of the oldest orders, and one thought to belong to the Cambrian period.

I might refer you to numerous other localities in our immediate vicinity and throughout the state, but you will acquire a knowledge of them as you pursue your studies and investigations later on. New Hampshire, although not furnishing many rare gems or rich mineral ores, will be found to contain many valuable and interesting varieties which can engage your attention for a long time to come."

September 27th, 1899. The President in the chair. The members present gave informal reports of their summer experiences and presented the following specimens to the Institute: Miss Emma L. McLaren, porphyritic trap and several small boulders from Nova Scotia; Mr. Winch, rare specimens of mica from Alstead, and beryl from Acworth; Mr. Huse, milky quartz from Auburn and Goffstown, mica schist from Auburn and soapstone from Francestown; Mr. L. W. Colby, fossiliferous limestone from Minnesota.

October 25th, 1899. The President in the chair. The season's work was discussed by Messrs. W. E. Moore, E. J. Burnham, G. I. Hopkins and E. P. Richardson. Upon motion it was voted to take up the study of mineralogy under the direction of Mr. Hopkins. Mr. Burnham presented to the Section and the Institute a copy of Hitchcock's Geology of New Hampshire, received from Hon. H. M. Cheney of the governor's council.

The following members presented specimens: E. P. Richardson, fossiliferous limestone from a boulder, two specimens of flinty shale and trap from Ogonquit, Me.; Mr. Burnham, quartz crystals, beryl from Orange and North Groton, epidote from Plainfield, chalcedony from Hampstead, trap from Boar's Head, tremolite from Randolph, and prehnite from Windham; Mr. Huse, claystones from McIndoe's Falls on the Connecticut River; Mr. Abbott, beryl from Orange, besides a number of other specimens.

November 22d, 1899. The President in the chair. Mr. Hopkins being unable to be present the President addressed the meet-

ing upon the classification of minerals for the sake of those beginning the study of mineralogy.

Mr. Moore presented specimens of iron pyrites from Manchester and Mr. Huse gave a boulder picked up in this city containing nodules of calcite.

December 4th, 1899. The Vice President in the chair. The meeting was addressed by Mr. Hopkins, who explained the proposed work in the determination of minerals and the apparatus needed. A large number of members signified their intention to secure the necessary supplies and take up the work of the Section.

December 20th, 1899. The Vice President in the chair. The regular work in the determination of minerals was done by the members under the direction of Mr. Hopkins.

This being the annual meeting the election of officers was taken up and the following elected :

GEORGE WINCH, *President.*  
MISS SUSIE C. FOGG, *Vice President.*  
MISS BLANCHE E. HICKEN, *Secretary.*  
MISS SARA HUNT, *Treasurer.*

EXECUTIVE COMMITTEE.

GEORGE I. HOPKINS,      WILLIAM E. MOORE.

## CHANDLER LECTURE COURSE.

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Through the generosity of Hon. George Byron Chandler, the following Course of Lectures has been tendered to the members of the Institute :

November 1st, 1899, "The Evolution of Power," by President T. C. MENDENHALL, of the Worcester Polytechnic Institute.

December 6th, 1899, "The Story of Evolution," by Prof. EDWARD S. MORSE, Director of the Peabody Academy of Science.

January 3d, 1900, "Birds of the Season," by Prof. FRANK M. CHAPMAN, of the American Museum of Natural History, New York city.

February 7th, 1900, "The Origin of Mountains," by Prof. GEO. H. BARTON, of the Massachusetts Institute of Technology, Boston.

March 7th, 1900, "Edible and Poisonous Mushrooms," by Mr. HOLLIS WEBSTER, Secretary of the Boston Mycological Society.

April 4th, 1900, "The Culture of the Imagination," by Prof. CHARLES ELIOT NORTON, of Harvard University.

## DONATIONS.

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The following comprises the donations to the Institute during the year 1899:

### BIRDS.

*Ardea virescens* (Green Heron); *Plectrophenax nivalis*, (Snow Bunting) mounted skeleton. George E. Burnham.  
*Accipiter fuscus* (Sharp-shinned Hawk); *Cyanocitta cristata* (Blue Jay.) Frank C. Twombly.  
*Colaptes auratus* (Flicker—Hairy Wicket.) William H. Huse.  
*Sialia sialis* (Blue Bird); *Dolichonyx oryzivorus* (Bobolink); *Ardea herodias* (Great Blue Heron); *Agelaius phoeniceus* (Red-winged Blackbird, pair; *Nyctala acadica* (Saw-whet Owl); *Ardea virescens* (Green Heron); *Botaurus lentiginosus* (Least Bittern.) Adam Graf.

### ANIMALS.

*Cervus Virginianus* (Virginia Deer)—two specimens. Manchester St. Railway.  
*Procyon lotor* (Raccoon); *Felis catus* (Wildcat or Bob-cat); *Vulpes fulvus* (Red Fox); *Fiber zibethicus* (Muskrat); *Sciurus carolinensis* (Gray Squirrel.) Harrie M. Young and Mrs. Mary S. Young.  
*Alces americana* (Moose) mounted head. Frank E. Heald.  
*Felis catus* (Wildcat or Bob-cat.) William H. Huse.  
*Sciurus hudsonius* (Red Squirrel)—mounted skeleton. George E. Burnham.

### ENTOMOLOGICAL SPECIMENS.

Order Odonata—57 specimens; Order Orthoptera—38 specimens; Order Hemiptera—63 specimens; Order Neuroptera—12 specimens; Order Lepidoptera—56 specimens; Order Diptera—32 specimens; Order Coleoptera—272 specimens; Order Hymenoptera—98 specimens; total, 628 specimens. Edward J. and George E. Burnham.  
2 Cuckoo Flies, 3 rare Moths, 1 Worker Bee, 1 Ichneumon Fly, 1 Butterfly, 1 *Calosoma scrutator*. Edwin A. Jones, Orlando, Florida.  
*Calosamia secropia*, female. Miss Minnie Dustin.  
*Calosoma scrutator*, 2 grasshoppers. Frank Davis, Orlando, Florida.  
Several cases of insects, as a memorial to her son. Mrs. Hannah C. Marshall.

## MINERALS.

- Fossiliferous Limestone.** Lyman W. Colby.  
**Specimens of local minerals.** George Winch, William H. Huse and Miss Emma L. McLaren.  
**Specimens of New Hampshire Minerals.** William H. Huse, Edwin P. Richardson, Edward J. Burnham, Charles J. Abbott.  
**Peacock Copper Ore, from the Little Miner Mine, Butte, Montana.** William E. Moore.

## BIOLOGY.

- Albino Hornpout.** Frederick A. Wallace.  
**Rattlesnake's skin (*Crotalus durissus*.)** Edwin P. Richardson.  
**Biological specimens in formaline, 47 bottles.** Edward J. and George E. Burnham.  
 Contributions to above specimens made by William H. Huse and Walter S. Abbott.  
**Female Tarantula, from Arizona.** William C. Clarke.  
**Double-headed Snake, Mexican Lizard.** George I. Hopkins.  
**Shells of *Anodonta fluviatilis* and *Unio complanatus* (freshwater Clams.)** William H. Huse.  
**A series of Skulls, being a partial list of the vertebrates of Hillsborough County.** Edward J. and George E. Burnham.

## TURTLES.

- Shells of all Turtles found in New Hampshire :** *Chelydra serpentina* (Snapping Turtle); *Chelopus insculptus* (Wood Turtle); *Aromochelys odoratus* (Musk Turtle); *Chrysemys picta* (Painted Turtle); *Chelopus guttatus* (Spotted Turtle); *Cistudo Carolina* (Box Turtle.) William H. Huse.  
***Chelopus guttatus* (Spotted Turtle); *Aromochelys odoratus* (Musk Turtle) 2; *Chelopus insculptus* (Wood Turtle) 2; *Chrysemys picta* (Painted Turtle) 4.** Harrie M. Young.

## BIRDS EGGS.

- 57 specimens of eggs, in cabinet.** William H. Huse.  
**Set of crows eggs.** George I. Hopkins.

## BIRDS NESTS.

- Cistothorus stellaris* (Short-billed Marsh Wren); *Compsothlypis americana* (Blue Yellow-backed Warbler); *Spizella socialis* (Chipping Sparrow.)** William H. Huse.  
***Dendroica vigosii* (Pine Warbler.)** Mrs. John B. Varick.

## INSECTS NESTS.

- White-tailed Hornets.** Harrie M. Young and Mrs. Mary S. Young.  
**Several Mud Wasps from Florida.** Edwin A. Jones, Orlando, Florida.

## WOODS.

Commercial woods of Florida. Edwin A. Jones, Orlando, Florida.

Wood peculiarly separated. Luther C. Baldwin.

Bark from Tupelo tree. William H. Huse.

## ART.

Painted panel, "Manchester Conferring the Laurel Wreath on her Dead Heroes."  
Miss Anna Custer.

Oil portrait of Col. John S. Kidder; oil portrait of Mrs. John S. Kidder. Mrs.  
Susan S. Palmer.

Medallions of Van Dyke, Emerson, Hawthorne, Longfellow, Poe, Liszt, Chopin,  
Dante, Handel, Haydn, Mendelssohn, Beethoven and Gluck. William H.  
Huse.

## BOOKS AND PAMPHLETS.

## OLD BOOKS.

Morse's Geography, published in 1814; Arts and Sciences, 1806; Manuscript of  
Patriotic Song, written about 1837 by Deacon Gregg, of Derry; Physician's  
Prescription Book in manuscript, dated 1798; Self Knowledge, John Mason,  
1793; Intellectual Philosophy, Abercrombie, 1841; Education, Spurzheim,  
1833; The Millennial Church, 1823. William H. Huse.

## GOVERNMENT REPORTS.

Mineral Resources of the United States, Geological Survey, 2 Vols.; Year Books,  
Agricultural Department, 8 Vols.; Smithsonian Report; Ku-Klux Conspir-  
acy; Statistical Abstract of the United States Treasury Department, 1894.  
William H. Huse.

Year Books, Department of Agriculture, 1897-1988; Scudder's Report on Fossil  
Insects of North America; Mineral Resources of the United States, Geolog-  
ical Survey, 1897-1898. Edward H. Fogg.

Ornithological and Entomological Bulletin of the Agricultural Department. Fred  
W. Lamb.

Volume Describing Routes of the Explorations in Alaska, accompanied with 10  
maps. Gordon Woodbury.

The Periodical Cicada. L. O. Howard, Government Entomologist.

## EDUCATIONAL.

Reports of Commissioner of Education, 12 Vols.; Proceedings of National Educa-  
tional Association, 2 Vols.; Proceedings of International Congress of Educa-  
tion; Proceedings of American Institute of Instruction, 2 Vols.; Promotions  
and Examinations in Graded Schools, Emerson, E. White, LL.D.; Fourth  
International Prison Congress; Report on Legal Education; Short-Hand In-

struction and Practice; The Spelling Reform; Rise and Growth of the Normal School Idea in the United States; Report of Committee on Secondary School Studies; Statistics of Public Libraries in the United States and Canada; History of Education — one volume each of Tennessee, Massachusetts, Iowa, Ohio, Michigan and Rhode Island; Education, Vol. IX, Sept. 1888 to 1891. William H. Huse.

## STATE REPORTS.

**First Report of the New Hampshire Association of Boards of Health; Report of State Board of Health, 1897-1898; Session Laws of New Hampshire, 1867 to 1887, 4 Vols., also 1889-1891; Constitutional Conventions of 1876 and 1889; Memorial Addresses; Biographies of New Hampshire Legislators.** William H. Huse.

State Department Reports for seventeen years. Myron W. Haseltine.

## CITY DOCUMENTS.

**City Reports for 1847, 1852, 1856, 1861, 1865, 1867, 1868, 1869, 1872, 1873, 1875, 1876, 1877, 1880; Manchester Directory, 1860; School reports, 1866 to 1887, 4 Vols.; Report of Trustees of City Library.** William H. Huse.

**City Reports for 1854, 1855, 1856, 1857, 1858, 1860, 1865, 1868, 1870, 1872, 1878, 1879, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, 1889, 1891, 1892, 1893, 1894, 1895, 1896, 1897; Inaugural Address of Hon. Charles H. Bartlett; Inaugural Address of Hon. Person C. Cheney; Valedictory Address of Hon. Isaac W. Smith; Valedictory Address of Hon. Person C. Cheney; Valedictory Address of Hon. Horace B. Putnam; Valedictory Address of Hon. George H. Stearns.** Oscar Perkins.

**City Reports for 1881, 1886, 1887, 1888, 1889, 1890.** Charles J. Abbott.

## MISCELLANEOUS BOOKS.

**Greeley's Arctic Expedition, 2 Vols.; Reminiscences of Class of 1886, Victor E. Stevens; The Great Cryptogram, Ignatius Donnelly; Native Trees, L. W. Russell; Lessons in Zoology, Claribel Gilman; Bee Keeper's Guide, A. J. Cook.** William H. Huse.

**Set of Encyclopædia Britannica.** Union Publishing Company.

**Scientific American, 5 Vols.** Myron W. Haseltine.

**A Preliminary List of the Birds of Belknap and Merrimack Counties, Compiled by Ned Dearborn.** Rev. Dr. C. S. Murkland.

**Set of Hitchcock's Geology of New Hampshire, with Accompanying Charts.** Hon. Harry M. Cheney.

**Proceedings at the Dedication of the Soldiers Monument, September 11th, 1879.** Manchester Cadets.

## FURNITURE AND FURNISHINGS.

Botanical Cabinet. Mrs. L. B. Clough.

Plate-glass Mirror; Wall Cabinet, containing a Dissecting Microscope for field work, and various articles for use of the Entomological and Botanical Sections. J. Brodie Smith.

Sash Curtains for Council-room and Library. Miss May W. Davis.

Inkstand, pens and bottle of ink; Match-holder made from fungus. William H. Huse.

Articles for toilet room. Charles J. Abbott.

## MISCELLANEOUS.

Electric Light for rooms. Manchester Electric Company.

\$100—to be used in purchasing cabinets; \$315—for "Chandler Lecture Course."

Hon. G. Byron Chandler.

Ornithological Chart. Mrs. J. W. Fellows.

Two Charts of North America, showing Zoological Zones. Miss Uusula M. Burnham.

Frames for above. J. E. Perkins.

Map of the United States; old Spinning-wheel; old Iron Firetongs; old Pewter Pot. William H. Huse.

Indian Arrow Heads, Indian Pottery, etc.; Chinese Wooden Spoon. George E. Burnham.

Skull dug up on lot at northeast corner of Concord and Chestnut streets. Frank M. Frisselle.

Montenegrin Sword; old Newspapers; old Map of the World. Mrs. Elizabeth M. Coaker.

Music, furnished at public meeting, March 22d, Manchester Symphony Orchestra.

## LOANS.

Mounted head of Rangifer tarandus, (Caribou.) G. P. Merrifield, Derry Depot.  
2 spinning-wheels, 2 clock reels, 1 ordinary reel, 1 hand reel, 1 cradle, 1 fire shovel,  
1 set wooden swifts, 1 pair wooden shoes, 1 fire bucket, 1 chair, 1 iron pan.  
Harrie M. Young and Mrs. Mary S. Young.

## SECTIONS ADMITTED.

Manchester Electric Club—A, Physical Science, January 12th.

Manchester Entomological Club—B, Entomology, January 17th.

Manchester Botanical Club—C, Botany, January 17th.

Manchester Ornithological Club—D, Ornithology, January 24th.

Manchester Art Association—E, Fine Arts, February 14th.

Geology and Mineralogy—F, June 10th.





PROCEEDINGS  
OF THE  
MANCHESTER INSTITUTE  
OF  
ARTS AND SCIENCES.

Vol. II, 1900.

Manchester, N. H.



PUBLISHED BY THE INSTITUTE.

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MANCHESTER, N. H.  
NATURE STUDY PRESS, DEAN AVE.

1901.

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PUBLICATION COMMITTEE.

FREDERICK W. BATCHELDER, ALBERT L. CLOUGH,  
WILLIAM H. HUSE.

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# MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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## BY - LAWS.

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### OFFICERS.

The officers of this corporation shall be a President, Vice Presidents, (the number of which to be determined by provisions hereinafter made) a Treasurer, a Clerk, a Corresponding Secretary, a Curator, and a Council constituted as hereinafter provided, all of whom shall be elected annually and hold their offices respectively for one year and until their successors are elected and qualified.

### DUTIES.

*President.* The President shall preside at all meetings of the association and discharge the usual duties of that office. He shall be the executive officer of the corporation and also be the presiding officer of the Council.

*Vice Presidents.* In the absence of the President a Vice President shall preside in his stead and discharge all the duties of the office, excepting that he shall not be the executive officer of the corporation.

*Treasurer.* The Treasurer shall discharge all of the usual duties of that office and shall give bond for the faithful performance of his duty, in such amount with sufficient sureties as shall be determined by the Council. He shall have the custody of the

seal of the corporation and shall render a report, suitably audited, of the financial condition of the association at the time of the annual meeting.

*Clerk.* The Clerk shall perform all of the usual duties pertaining to his office and such other duties as may be required from time to time by the Council, and shall be sworn to the faithful performance of his duties. He shall also be clerk of the Council.

*Corresponding Secretary.* The Corresponding Secretary shall discharge all the duties customary to his office, shall conduct correspondence with other associations and persons alike interested, shall have the care and custody of the documents, books and papers not connected with or incident to the records and papers not properly belonging to the office of the Clerk, and he shall perform all such other duties as the Council may require.

*Curator.* The Curator shall have the care and custody of the library, cabinet, art gallery and other property of the Institute, and perform such other duties as may be required by the Council.

*Council.* The Council shall consist of not less than seven members, and the number required for such membership, in addition to President, Clerk, Corresponding Secretary, Treasurer, Curator, and Vice Presidents, as hereinafter provided, shall be elected annually by the corporation. The Council shall have power to appoint all necessary committees.

#### MEMBERSHIP.

Any association, club or organization may become a member of this corporation, with the approval of the Council, by filing with the Clerk an application stating the name and purpose of such organization, with a request to be admitted as a member, and the payment of one dollar. Such membership, when obtained, shall make by the operation of this by-law all of the members of said association, club or organization members of this corporation upon subscribing to the by-laws.

Any person may be elected to membership by the Council upon being recommended by two members, paying the Treasurer the sum of one dollar and subscribing to the by-laws. All appli-

cations for membership should designate the section or sections with which the applicant will unite.

Any person may be elected a corresponding member of the Institute by a unanimous vote of the Council, and such member shall be exempt from the payment of dues and membership fee. Any person who shall pay to the Institute the sum of one hundred dollars at any one time shall, on his request, be elected a life member, and as such shall be exempt from all further dues and assessments.

#### SECTIONS.

Any association, club or organization, admitted to membership as hereinbefore provided, may become a section, which shall be designated alphabetically by the Council, and have authority to establish its title, to maintain its autonomy and manage its affairs, not inconsistent with these by-laws.

Each section shall have a chairman who shall discharge all of the duties pertaining to such office and ex-officio be and become a Vice President of the association and a member of its Council. Such chairman shall be elected by the section at or before the time of the annual meeting of the association and his election shall be certified by the Secretary of the section to the Clerk of the corporation.

Five or more members may organize a section, with the approval of the Council.

#### MEETINGS.

The annual meeting of the corporation shall be held upon the first Wednesday of January, at such hour and place as the Clerk shall deem expedient. Special meetings may be held at such time and place as the Council shall deem expedient. Notice of all meetings shall be given by publication in some newspaper in the city of Manchester by one publication at least ten days prior to said meeting or by written or printed notice by mail to the last known address of each member at least ten days prior to the meeting.

#### DUES.

The annual dues shall be three dollars, payable in advance.

New members shall be charged for whole months or fraction thereof to the time of the next annual meeting. Any person who fails to pay such dues for one year shall cease to be a member, and his or her name may be stricken from the roll by vote of the Council, after notice by the Clerk of the corporation setting forth such delinquency and the provision of this by-law, and any member may be removed by the Council for cause upon charges after due notice and hearing.

#### QUORUM.

At any meeting of the corporation ten members shall constitute a quorum.

#### AMENDMENTS.

These by-laws may be altered or amended at any meeting of the association, notice having been given of the proposed change.

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The following Amendment to the By-Laws was adopted June 1, 1900:

#### BRANCHES.

Five or more persons organizing themselves as an association, or any association previously formed, the purposes of which are harmonious with those of the Institute and which consists of five or more persons, not residents of Manchester, may apply for membership in the Institute and, upon election, shall become a branch of the same. Such branch, as a whole, shall be entitled to all privileges and subject to all rules which refer to individual members and shall, in a general way, be regarded and treated as such. It shall be incumbent upon such branch to make return to the Clerk of the Institute of the names and addresses of its members and of its officers at the time of their election, together with a report of the condition and year's work of the branch.

Any individual member of such a branch, being a non resident of Manchester, shall be entitled to the general privileges of the Institute Rooms, Library and Collections and to such other privileges as the Council may from time to time extend.

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MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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OFFICERS FOR 1900.

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ALBERT L. CLOUGH, *President.*

EDWARD J. BURNHAM, *Corresponding Secretary.*

NORWIN S. BEAN, *Treasurer.*

HARRIE M. YOUNG, *Clerk.*

GEORGE I. HOPKINS, *Curator.*

**COUNCIL.**

ALBERT L. CLOUGH.

EDWARD J. BURNHAM.

NORWIN S. BEAN.

HARRIE M. YOUNG.

GEORGE I. HOPKINS.

G. BYRON CHANDLER.

J. BRODIE SMITH.

WM. K. ROBBINS.

MRS. MELUSINA H. VARICK.

HENRI SCHÆFFER.

OLIVER E. BRANCH.

CHARLES J. ABBOTT.

MRS. S. C. BROWN.

MRS. ANNIE V. BATCHELDER.

WM. H. HUSE.

GEORGE WINCH.

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## ROLL OF MEMBERS.

JAN. 1, 1901.

Abbott, Miss Annie F.	Bourne, Stephen N.
Abbott, Florence L.	Boutwell, Mrs. Mary S.
Abbott, Mrs. Hattie S.	Bower, Fred B.
Abbott, Miss Maude C.	Branch, Oliver E.
Abbott, Charles J.	Branch, Mrs. Sarah C.
Abbott, Walter S.	Brickett, Miss Mabel J.
Adams, Charlotte R.	Broderick, James A.
Africa, Walter G.	Brooks, Miss Gertrude H.
Aldrich, Dr. E. B.	Brown, Mrs. Abby S.
Aldrich, Mrs. E. B.	Brown, George H.
Allen, Mrs. Fred L.	Brown, Dr. James S.
Andrews, Frank E.	Brown, Mrs. Marie E.
Ansell, William H.	Brown, Mary E.
	Brown, Mrs. S. C.
Bailey, Henry L.	Bryant, E. M.
Balch, Mrs. Charles E.	Buck, William E.
Baldwin, E. T.	Bullock, Dr. Lillian G.
Baldwin, Mrs. E. W.	Burbank, William E.
Bancroft, Clarence	Burnham, Miss Bessie I.
Barker, Miss Ella F.	Burnham, Edward J.
Barlow, Burton	Burnham, Mrs. Edward J.
Barnes, Miss Mary F.	Burnham, George E.
Barney, Hial	Burnham, Henry E.
Bartlett, Rev. A. Eugene	Butman, Mrs. Jennie C.
Bartlett, Mrs. A. Eugene	Butterfield, Miss Annie C.
Batchelder, Frederick W.	Byrne, Miss Edith N.
Batchelder, Mrs. Annie V.	
Batchelder, Miss Kate E.	Call, W. R.
Bean, Norwin S.	Carpenter, Frank P.
Bickford, Charles W.	Carpenter, Mrs. F. P.
Bickford, Mrs. Emma S.	Carpenter, Josiah
Bisco, George	Carpenter, Mrs. Josiah
Blair, Mrs. Eliza N.	Carter, George C.
Blake, Miss Annie F.	Cass, Edgar D.
Blood, Mrs. Lavina K.	Castor, Mrs. Edgar E.
Bossi, Arnold L.	Caswell, Fred M.
Bourne, Mrs. Harriet K.	Challis, Frank H.
Bourne, Henry D.	Chandler, Mrs. Fanny M.
Bourne, Miss Meta	Chandler, George Byron

- |                         |                           |
|-------------------------|---------------------------|
| Chandler, George H.     | Dodge, Mrs. Helen K.      |
| Chandler, John M.       | Dole, A. W.               |
| Chase, C. Edwin         | Dow, Miss Florence        |
| Cheney, Miss Georgia M. | Dow, Miss Sarah E.        |
| Cheney, Miss Ruth I.    | Dowd, Mrs. Mary H.        |
| Christophe, Sebastian   | Downs, Mrs. Clara L.      |
| Christophe, Mrs. S.     | Dowst, Miss Ella M.       |
| Clapp, Allen N.         | Dowst, John               |
| Clapp, Horace T.        | Drew, Mrs. Annette H.     |
| Clarke, Mrs. Olive Rand | Dustin, Charles R.        |
| Clarke, William C.      | Dustin, Mrs. C. R.        |
| Clement, Miss Mary A.   |                           |
| Cleworth, Harold B.     | Eames, William M.         |
| Cleworth, John          | Eames, Mrs. Hortense H.   |
| Cleworth, Mrs. John     | Edgerly, Clarence M.      |
| Cleworth, Mildred W.    | Ela, Miss Emma J.         |
| Clough, Albert L.       | Elliott, Mrs. Medora W.   |
| Clough, Mrs. L. B.      | Elliott, William H.       |
| Clough, Miss Nora B.    | Elliott, Mrs. W. H.       |
| Collins, Mrs. E. H.     |                           |
| Cooper, Miss Emma J.    | Fairbanks, Miss Elsie D.  |
| Corey, William          | Farmer, Mrs. Lucinda L.   |
| Corson, Miss Annie R.   | Felch, Miss Sadie C.      |
| Cottrell, Benjamin S.   | Fellows, Joseph W.        |
| Court, Ormsby A.        | Fellows, Mrs. J. W.       |
| Crafts, George P.       | Ferren, Miss Kittie J.    |
| Crafts, Mrs. G. P.      | Ferrin, A. W.             |
| Crosby, Uberto C.       | Fogg, Edward H.           |
| Crosby, Mrs. U. C.      | Fogg, Miss Susy C.        |
| Cross, David            | Foster, John              |
| Cross, Mrs. David       | Foster, Mrs. John         |
| Currier, Dr. Edward H.  | Fracker, Miss M. Alma     |
| Currier, Mrs. Emma F.   | Francis, Miss Florence M. |
| Currier, Edward S.      | French, Charles H.        |
| Currier, Mrs. Moody     | French, Mrs. Emma B.      |
| Custer, Miss Anna       | French, Dr. L. Melville   |
|                         | French, Mrs. Mary E.      |
| Dana, Miss Mary F.      |                           |
| Daniels, Miss Belle R.  | Gage, Miss Mary J.        |
| Davis, Miss Edith H.    | Gault, John               |
| Davis, George M.        | Gay, Miss Annie M.        |
| Davis, Mrs. G. M.       | George, Miss Ethel L.     |
| Davis, Miss May W.      | Gillan, Miss Jean         |
| Derby, Miss Lizzie M.   | Gooden, Miss Kate M.      |
| Dickey, Miss Esther M.  | Gorrell, Mrs. M. M.       |

- |                             |                            |
|-----------------------------|----------------------------|
| Graupner, Miss Amelia L.    | Lamprey, Miss Alice Maud   |
| Graupner, Miss Hulda C.     | Lane, Thomas W.            |
|                             | Lewis, Walter H.           |
| Hadcock, Mrs. William       | Livingston, Frank C.       |
| Hale, Arthur H.             | Lockhart, Rev. Burton W.   |
| Hale, Fred C.               | Lockhart, Mrs. Frances U.  |
| Hall, Miss E. Alfreda       | Longa, Charles E.          |
| Hartshorn, Fred G.          | Lord, Miss M. Eugenia      |
| Hartshorn, Mrs Minnie L.    |                            |
| Hassam, R. H.               | Mack, Miss Isabella G.     |
| Hayes, Charles C.           | MacLeod, Mrs. Alberta A.   |
| Head, Miss Caroline E.      | MacLeod, Donald            |
| Heald, Frank E.             | Mallard, Karl L.           |
| Heard, Arthur M.            | Manning, Charles H.        |
| Herrick, Henry W.           | Manning, Mrs. Frances Fay  |
| Hicken, Miss Blanche E.     | Manning, Robert L.         |
| Higgins, Edmund F.          | Marr, Mrs. Frances         |
| Higgins, E. Safford         | Marshall, Miss Alice       |
| Higgins, Wilson F.          | Martin, Frank E.           |
| Hoit, Miss Carrie E.        | Martin, Miss Winona M.     |
| Holt, Miss E. Blanche       | McAllister, George I.      |
| Hope, Miss Ella             | McAllister, Mrs. Mattie H. |
| Hope, Miss Lucy Maud        | McDuffie, Charles H.       |
| Hopkins, George I.          | McDuffie, Mrs. Laura B.    |
| Hoyt, William J.            | McKean, Miss Ellen E.      |
| Hubbard, Miss Martha W.     | McLaren, Miss Emma L.      |
| Hunt. Mrs N. P.             | McLaren, H. N.             |
| Hunt, Miss Sara             | McLaren, Miss Mary E.      |
| Hurd, Henry N.              | Means, Mrs. Elizabeth A.   |
| Huse, Mrs. Isaac            | Merrill, Albert            |
| Huse, William H.            | Mitchell, Miss Mary W.     |
| Huse, Mrs. W. H.            | Mooar, Miss Linda Hunter   |
| Hyde, T. McEwen             | Moore, Miss Florence H.    |
|                             | Moore, Miss Helen M.       |
| Jackson, George R.          | Moore, Miss Marcia M.      |
| James, Mrs. Mary J.         | Morrill, Miss Florence M.  |
| Jenkins, A. A.              | Morrill, Mrs. Hattie T.    |
|                             | Morse, Mrs. Clara H.       |
| Kemp, Miss Bertha L.        | Morse, Henry H.            |
| Kendall, Mrs. John M.       | Morse, Mrs. L. L.          |
| Kendall, Willis B.          | Morse, Miss Millicent S.   |
| Kennard, Samuel C.          | Morse, Dr. M. V. B.        |
| Kennard, Mrs. S. C.         | Moulton, Miss Fannie D.    |
| Kew, Mrs. Ursula M.         | Moulton, Miss Mary E.      |
| Knowlton, Mrs. Maud Briggs. | Murkland, William E.       |

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|-----------------------------|--------------------------|
| Nelson, James M.            | Sargent, F. W.           |
| Nichols, William T.         | Schæffer, Henri          |
| Normand, Miss Eva           | Shontell, Frederick W.   |
| Nutt, Miss May F.           | Simmons, Mrs. E. M.      |
| Nutting, Fred S.            | Simmons, Walter W.       |
|                             | Simons, Mrs. Grace A.    |
| Olzendam, Mrs. A. P.        | Slayton, Edward M.       |
| Ormsby, R. S.               | Smith, Mrs. A. D.        |
| Osgood, Anson G.            | Smith, Arthur J.         |
|                             | Smith, Dante             |
| Parker, Henry W.            | Smith, Miss Emily E.     |
| Parker, Miss Nellie C.      | Smith, J. Brodie         |
| Parker, Walter M.           | Smith, Leonard G.        |
| Parker, Mrs. W. M.          | Smith, Miss May L.       |
| Patten, Miss Annie W.       | Smith, Miss Nellie M.    |
| Peaslee, Mrs. Nellie D.     | Snow, Miss Nellie W.     |
| Peaslee, Robert J.          | Spaulding, F. L. V.      |
| Perkins, David W.           | Squire, Miss H. L.       |
| Perkins, Mrs. Frederick     | Stanton, Miss Theresa B. |
| Phillips, Miss Grace A.     | Staples, Rev. Charles J. |
| Phinney, George H.          | Staples, Mrs. Grace D.   |
| Preston, Mrs. M. Clara      | Stark, Augustus H.       |
| Price, Mrs. S. E.           | Stark, Mrs. A. H.        |
| Priest, Miss Electa M.      | Stearns, H. A.           |
| Priest, Mrs. Lucia Mead     | Stevens, Victor E.       |
|                             | Stockbridge, Dana W.     |
| Reed, Miss Helen E.         | Straw, Herman F.         |
| Richardson, Charles L.      | Straw, Mrs. H. F.        |
| Richardson, Edwin P.        | Stuart, Miss Alice M.    |
| Richardson, Miss Florence   |                          |
| Richardson, Mrs. Harriet B. | Taintor, Charles W.      |
| Richardson, Miss Harriet H. | Taggart, Miss Alice C.   |
| Richardson, Herbert E.      | Thompson, A. W.          |
| Richardson, James M.        | Tolman, Miss Mary M.     |
| Richardson, Miss Theodora   | Topliff, Miss Ellen A.   |
| Richardson, Miss Susan A.   | Tuson, Miss Eva F.       |
| Robbins, Mrs. Ellen R.      | Tuttle, Miss Hattie S.   |
| Robbins, William K.         | Tynan, Miss Mary G.      |
| Robinson, Ed. R.            |                          |
| Robinson, Dr. J. Franklin   | Varick, John B.          |
| Rowe, Miss Olive A.         | Varick, Mrs. Melusina H. |
| Ryder, Bayard C.            | Varick, Mrs. Thomas R.   |
|                             | Varick, Dr. W. R.        |
| Sanborn, A. H.              | Varney, David B.         |
| Sargent, Herbert G.         | Varney, Miss Emma L.     |

Varney, Mrs. Harriet B.	Williams, Miss Harriet A.
	Williams, J. Arthur
Walker, Miss Flora M.	Williams, Mrs. J. A.
Waring, Miss Annie E.	Wilson, Miss Ida Belle
Warren, Miss Marion F.	Wilson, R. W.
White, Louis B.	Winch, George
White, William L.	Wing, Miss Caroline E.
Whittemore, L. B.	Woodbury, Gordon
Whitten, John H.	Woodbury, Mrs. Gordon
Whitten, Mrs. J. H.	Woodruff, Harry G.
Wiggin, Miss Ellen F.	Woodman, Miss Susie G.
Willand, Miss Alta C.	
Willand, Miss Hattie O.	Young, Harrie M.
Williams, Miss Bertha M.	Young, Miss Jennie

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Clarence M. Brooks,	Keene, N. H.
Alvah A. Eaton,	Seabrook, N. H.
Bela H. Emerson,	Hooksett, N. H.
Miss Sarah E. Parker,	Pembroke, N. H.
J. H. Prescott,	Foxboro', Mass.
John A. Wheeler,	Milford, N. H.

## LIFE MEMBERS.

George Byron Chandler.	Mrs. Aretas Blood.
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## CUSTODIANS.

Miss Susy C. Fogg.	Herbert G. Sargent.
Walter S. Abbott.	

ZOOLOGICAL AGENT, George E. Burnham.

AGENT, Sherburne Fowler, Pembroke, N. H.

LIBRARIAN, Charles J. Abbott.

## BRANCHES.

Suncook Improvement Association, Suncook Branch, No. 1.



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MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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**SECTION A.**

**PHYSICAL SCIENCE.**

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**Officers for 1900.**

CHARLES J. ABBOTT, *President.*

DR. E. B. ALDRICH, *Vice President.*

EDWARD J. BURNHAM, *Treasurer.*

CHARLES R. DUSTIN, *Recording Secretary.*

FREDERICK W. SHONTELL, *Financial Secretary.*

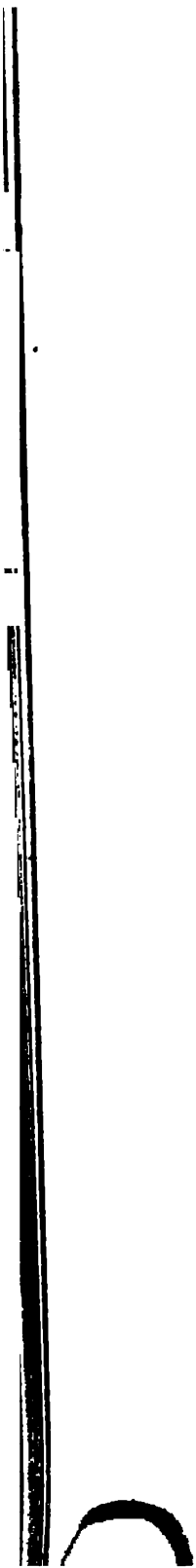
**EXECUTIVE COMMITTEE.**

HENRI SCHÆFFER

WILLIAM H. HUSE.

CHARLES W. TAINTOR.

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**SECTION A.**  
**PHYSICAL SCIENCE.**

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REPORTS OF MEETINGS—1900.

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Monday evening, January 15. A repetition of the pendulum experiment for the determination of the value of the acceleration of gravity and for the demonstration of the earth's rotation, under the direction of E. J. Burnham, Albert L. Clough, and G. I. Hopkins.

Monday evening, February 5. An exhibition of the Ives Kromskop and explanation of the principles and practice of color photography.  
ALBERT L. CLOUGH.

Monday evening, February 26. A review of the life of Joseph Henry and his contributions to physical science.

EDWARD J. BURNHAM.

Monday evening, March 12. The Automobile, the Vehicle of the Future. Illustrated by lantern slides.

ALBERT L. CLOUGH.

Monday evening, March 26. The Evolution of the Horse.

WILLIAM H. HUSE.

Monday evening, April 9. The Life and Work of Moses Gerish Farmer.

WALTER S. ABBOTT.

Monday evening, April 23. The Modern Newspaper, with excursion through the plant of the Union Publishing Company.

EDWARD J. BURNHAM.

Monday evening, May 7. The Three-Color Printing Process.

ALBERT L. CLOUGH.

Monday evening, May 21. Eclipses; with special reference to the approaching solar eclipse of May 28.

GEORGE I. HOPKINS.

Monday evening, June 4. Wireless Telegraphy ; with demonstration by means of apparatus. H. A. STEARNS.

Monday evening, October 1. The Recently Discovered Elements Radium and Polonium. HENRI SCHÆFFER.

Monday Evening, October 15. An Excursion into the Realm of Atoms. REV. CHARLES J. STAPLES.

Monday evening, November 12. The Modern Giant and His Youthful Rival ; a discussion of the steam and gas engine as prime movers. ALBERT L. CLOUGH.

Monday evening, November 26. Some Lessons from Evolution ; with particular reference to the relation of environment to development. WILLIAM H. HUSE.

Monday evening, December 10. Physical Science in America ; with special mention of the work of Benjamin Franklin, Benjamin Thompson and Thomas C. Mendenhall.

EDWARD J. BURNHAM.

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MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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**SECTION B.**  
**ENTOMOLOGY.**

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**Officers for 1900.**

EDWARD J. BURNHAM, *President.*  
GEORGE E. BURNHAM, *Vice President.*  
SUSY C. FOGG, *Secretary.*  
WALTER S. ABBOTT, *Treasurer.*

**EXECUTIVE COMMITTEE.**

DR. LILLIAN G. BULLOCK, HULDA C. GRAUPNER,  
MAY L. SMITH.

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**SECTION B.**

**ENTOMOLOGY.**

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REPORTS OF MEETINGS—1900.

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Monday evening, January 8. Regular meeting; fourteen members present. The President in the chair.

Lillian G. Bullock, M. D., Chairman of the Executive Committee, submitted the program for the coming six months, and the same was adopted without change.

Before opening upon the regular program, the President gave a brief introductory talk on the work of the engraver beetle, suggested by a section from a limb of the white pine, recently presented by J. J. Dearborn, M. D., of Salisbury, N. H. The specimen is one and a half inches in diameter and two feet in length, the entire surface being elaborately carved by the larvæ of this insect, which did considerable damage to the white pine in Salisbury and vicinity during the year 1899.

George E. Burnham read a paper on "Pond Life in Winter," with special reference to a pool with muddy bottom, near the Bald Hill road. Here had been found the water scorpion (*Nepa apiculata*), the larvæ of several species of dragon-fly, stone-fly, and caddice-fly larvæ, a species of *Gyrinus* in considerable numbers, also two of the *Hydrophilidæ*, and two species each of the *Dyticidæ* and *Corisidæ*. The larvæ of the "cob-house" building caddice-fly exceeded any other insect in numbers at this station. In a brook not far distant, the pebble building caddice-fly abounds in the vegetable covering of the submerged stones, and they are also abundant in similar situations in the brook which crosses Smyth road—in each instance the insects finding both building material and food brought to them by the swiftly flowing water.

At the conclusion of the paper and a brief discussion, the re-

mainder of the evening was devoted to a comparative study of the venation of the wings of the Nymphalidæ.

Monday evening, January 22. Regular meeting ; fifteen members present. The President in the chair.

Lillian G. Bullock, M. D., presented a paper on "Some Analogies between Insect and Human Anatomy." Some time was devoted to the definition of the terms "homologue" and "analogue" and the use of the same terms for parts which present analogies rather than homologies was explained by the fact that the early scientists, who gave names to the parts of the insect structure, were in general familiar with human anatomy before they gave attention to entomology, and applied to the latter science the terminology to which they were already accustomed. The cranium, in both man and insect, contains the brain, while the heads of each present a further similarity in the tendency toward the specialization of external organs of sense. The tergum, pleura and sternum of the thorax in insects were suggestive of the spine, ribs and sternum in man ; while in both forms of life the muscles act variously as rotators, elevators, depressors, adductors, abductors, flexors and extensors. The nerves of insects, as in man, are specialized as sensory and motor, and nerves of special sense; the outer layer of the brain is grayish in color, and the medullary portion is white. There is a sympathetic nervous system, which supplies the heart, œsophagus and salivary glands, and also sends off branches to join the principal nervous system. The alimentary canal of the insect is divided naturally into parts somewhat similar in form and function to the divisions of the same canal in man, and have received, in general, the same names. The insect's heart, while not resembling the human heart in shape, performs the same office. The blood in insects is composed of serum, in which float corpuscles, and the blood is aerated by coming in contact with the oxygen of the air, and the process of respiration, as in the higher animals, is carried on by muscular contraction and relaxation.

The President gave the next in his series of talks for beginners ; his subject being "Coleoptera."

Monday evening, February 5. Regular meeting; fourteen members present. President in the chair.

By reason of a conflict in dates, Section A met on the same evening, and through an amicable arrangement each section in turn became guest of the other. The special feature of Section B's contribution was a paper by the Secretary, "Notes on Orthoptera."

Monday evening, February 19. Regular meeting; thirteen members present. The President in the chair.

The Diptera supplied the topic for the President's elementary talk.

Miss Amelia L. Graupner read the paper of the evening, "Bees; a Study in Venation." The paper, which was illustrated by blackboard drawings of special types, and by mounted slides of the wings of bees found about Manchester, including *Andrena*, *Halictus*, *Augochlora*, *Ceratina*, *Bombus* and others, led to an interesting discussion of the sub-marginal cells, and the relative position of the recurrent nervures.

Monday evening, March 5. Regular meeting; twenty members present. The President in the chair.

A plan for a summer school in connection with the Institute, which should enlarge the scope of Sections B, C, D and F, was submitted by the President.

Miss May W. Davis read a paper containing an account of personal observations made during August, 1898, upon *Chionaspis furfurus*, or the scurfy bark louse, found infesting a Mountain Ash (*Sorbus americanus*) on the west shore of Lake Winnipeg. This tree had previously been cut, and had grown again, in the form of several shoots from the original trunk. The older, woody stems or branches near the ground were entirely encased by these scales, forming a complete covering, so closely did they touch and overlap one another. To the casual observer it appeared as a rough, gray bark. Nearer the top and on the younger branches, the insects were not so numerous, but in the protected spots, as the axils of the branches and twigs, the scales appeared to be crowded into uneven layers. On the

smaller branches were noticed several beetles of the species *Adalia bi-punctata*, and on a leaf the larvæ of the same. Their presence on the infested tree was significant, although they were never observed devouring the scales.

The members of the section examined specimens of scale life under the microscope, and also made some study of the Stem-eyed Flies (*Sphyracephala brevicornis*) found by the President on March 4.

The President closed his series of elementary talks upon the orders with some general remarks upon the Hymenoptera and their place in the scale of insect development.

Monday evening, March 19. Regular meeting; seventeen members present. The President in the chair.

Walter S. Abbott read a paper on *Anosia plexippus*, which contained an interesting account of his success in rearing this common and beautiful species during the past summer. One caterpillar that he had the good fortune to observe during its change suspended itself September 1, and transformed to a chrysalis in the night of the 3d. After this the color of the chrysalis began to darken very slowly, and by the 19th there appeared a purplish tinge. On the morning of the 20th the faint outline of the wing could be seen through the transparent shell of the chrysalis. At eleven o'clock the wing was quite distinct; by three o'clock the veins and spots were plainly visible, and at five o'clock the whole chrysalis, where the wings were not plainly to be seen, had turned to a deep purple, although the butterfly did not emerge until 7:45 o'clock on the morning of the 21st. When they first emerge, the wings are very soft and flexible and cannot be held erect. In one instance the butterfly remained upon a flower in the sunshine over two hours before it became strong enough to fly away.

The remainder of the evening was devoted to a further study of venation.

Monday evening, April 2. Regular meeting; eight members present. The President in the chair.

George E. Burnham presented a paper upon *Termes flavipes*,

with an account of an observation made upon a considerable collection of these insects a few days previous. A large number of *Termes*, comprising workers, soldiers and nymphs, had been taken from a single colony found beneath a stone in the edge of woods near Derryfield Park. A box was partially filled with earth, upon which the insects were placed. At first all was confusion, but in a short time order was so far secured that the workers, divided in three groups, began excavating as many vertical shafts, about three inches apart, while the soldiers stood on guard around them. The nymphs continued in disorder, hurrying about, or endeavoring to find shelter at the corners of the box. When the workers had descended to the depth of about two inches, they began to tunnel horizontally, connecting the shafts. As this work progressed, the soldiers, one by one, followed until a few only remained about the entrances. So soon as the vertical shafts had been connected by the horizontal tunnel, several workers reappeared, and, running about in search of the nymphs, began conducting them below. In a few minutes all were in safety below ground, except one. She had found partial concealment behind a lump of earth in a remote corner. Presently two workers reascended and instituted a systematic search, finding the stray nymph and conducting her to the new habitation. The last of the soldiers then retired, and nothing above ground suggested the presence of the "white ants." Thirty-five minutes elapsed between the placing of the *Termites* in the box and the retirement of the last individual.

Monday evening, April 16. Regular meeting; four members present. The President in the chair.

In the absence of the Secretary, Dr. Bullock was chosen Secretary pro tem. Miss Richardson also being unable to be present, her paper was postponed. The President gave an informal talk on the relation existing between ants and aphids.

Monday evening, April 30. Regular meeting; seventeen members present. The President in the chair.

George E. Burnham gave an account of some successful experiments made by himself while securing plaster casts of the nests of *Andrena vicina* and the holes of *Lycosa fatifera*.

The President occupied the remainder of the evening with observations upon the early stages of *Blatta germanica*, illustrated with the microscope.

Monday evening, May 14. Regular meeting; ten members present. The President in the chair.

The evening was devoted to the study of new arrivals during the past two weeks, among them being *Anax junius*, brought in by Walter S. Abbott.

It was voted to hold an outing at Lake Massabesic on Memorial Day.

Monday evening, May 28. Regular meeting; nine members present. The President in the chair.

A comparative study was made of *Enallagma civile*, and the President gave an account of a flight of *Formica pennsylvanica*, which he had recently witnessed. The meeting was then open for notes from members.

Monday evening, June 11. Regular meeting; ten members present. The President in the chair.

A paper on the family Carabidæ was presented by William H. Huse. It was voted to adjourn for the summer recess.

Monday evening, October 9. Sections B and D united in a joint meeting, in accordance with an arrangement by their respective executive committees, the purpose being to make a brief review, for a few successive meetings, of the general principles of vertebrate zoology as a preparation for more advanced work later on. Nine members were present. Mrs. Annie V. Batchelder, President of Section D, was invited to preside.

E. J. Burnham, on behalf the executive committees, outlined the plan of work suggested, and then gave a succinct account of views held at various periods as to the distinction between vegetable and animal life.

It was voted to invite Dr. Lillian G. Bullock to present a demonstration of the backbone at the next meeting.

Monday evening, October 22. Joint meeting of Sections B and D; nineteen members present.

Dr. Bullock presented a study of the skull and cervical and

dorsal vertebræ in man, with comparisons with the lower forms of vertebrates.

Monday evening, November 5. Regular joint meeting of Sections B and D; seventeen members present. President Burnham outlined the structural characteristics of the Mammalia. The remainder of the evening was devoted to a comparative examination of the skulls of different types, under the direction of Dr. Bullock, with special reference to occipital condyles and facial sutures.

Monday evening, November 19. Regular meeting of Sections B and D; twelve members present. President Batchelder in the chair. By request, Mrs. Batchelder gave a report of the recent meeting of the American Ornithologists' Union at Cambridge.

The evening was then devoted to practice in the classification of the Feræ by dental and cranial characteristics.

Monday evening, December 3. Regular joint meeting of Sections B and D; nineteen members present. President Burnham in the chair.

The following officers were elected for the ensuing year :

*President*—Theodora Richardson.

*Vice President*—Walter S. Abbott.

*Secretary*—Susy C. Fogg.

*Treasurer*—Charles R. Dustin.

*Executive Committee*—Lillian G. Bullock, M. D., Hulda C. Graupner, Helen E. Reed.

The evening was devoted to a study of the foramina of the skull, under the direction of Dr. Bullock.

Monday evening, December 17. Regular joint meeting of Sections B and D; eleven members present. President Richardson in the chair. The eyes of vertebrates, with special reference to the chiasma and the crossing of the optic nerves, furnishing the subject of study for the evening.

Monday evening, December 31. Regular joint meeting of Sections B and D; eighteen members present. The evening was devoted to the external structure of fishes, under the direction of Mr. Burnham.



## A ROCK RIMMON CATCH.

CONTAINING ADDITIONAL SPECIES OF ORTHOPTERA NOTED  
IN THE VICINITY OF MANCHESTER.

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BY MISS SUSY C. FOGG.

Westward of our city lies Rock Rimmon, that bold outcropping in the chain of granitic ledges which surround our valley. The sun and shadows of passing clouds play upon it till, with the vari-tinted mists that often envelop it, all the moods of a mountain are displayed upon its rugged face, but none can know the friendliness and shelter of this great rock like the innumerable creeping and crawling things that live among its crevices and conceive of its having no other use than to afford them opportunity for basking in the sunshine.

Upon the rock, and the barren sandy plains at its base, scantily clothed with stunted oaks, pines and wiry grass, we find great numbers of the Acrididæ, which rise up, multiply and disappear, with scarcely their usual check from human source or more natural enemies. In two hours' time, on a warm day during the second week of September, I was able to locate fifteen species of Acrididæ within small area. This list may be of interest, as follows:

### Sub-Family Tryxalinae.

- 1 *Chloealtis conspersa* Harris.
- 2 *Stenobothrus curtipennis* Harris.
- 3 *Orphulella speciosa* Scudder.

### Sub-Family CEdipodinae.

- 4 *Arphia Xanthoptera* Burmeister.
- 5 *Spharagemon collare* Scudder.
- 6 *Spharagemon bolli* Scudder.
- 7 *Scirtetica marmorata* Harris.
- 8 *Dissosteira carolina* Scudder.
- 9 *Encoptolophus sordidus* Burmeister.
- 10 *Psinidia fenestralis* Serville.

**11 *Circotettix verruculatus* Kirby.****Sub-Family Acridinæ.****12 *Schistocera rubiginosa* Harris.****13 *Melanoplus scudderi* Uhler.****14 *Melanoplus atlanis* Riley.****15 *Melanoplus femur-rubrum* De Geer.**

The unusually dry season of 1900 was most favorable to increase of the locust tribe, and from a general observation of the locality under consideration, the species appeared evenly distributed, though the *Melanopli*, *Arphia xanthoptera*, *Spharagemon collare*, *Dissosteira carolina*, *Encoptolophus sordidus* and *Cercotettix verruculatus* probably predominated.

*Stenobothrus*, not so noticeable to the casual observer as the bright-winged locusts, was present in good numbers, some very good examples of both long and short wings being taken.

Upon examination of a larger number of specimens and by aid of additional descriptive material, I believe *Stenobothrus maculipennis* should be cancelled from our list heretofore published and *Orphulella speciosa* inserted in its place. Individuals taken the previous year had a tendency to follow *S. maculipennis* in coloration and wing length, but those more recently collected have taken on all the varying hues of green, purple and brown to which they are entitled and a correspondingly wide range in length of wings.

The *Arphias* of Rock Rimmon are rich and finely marked in color which together with their substantial size make them most alluring to the collector.

The species that I have designated as *Spharagemon collare*, I take to be the New England form of Say's *Gryllus æqualis* or, as I previously listed, *Dissosteira æqualis*.

Thomas Say's original description of this species was read June 1, 1824, in the list of "new Hemipterous insects collected in the Expedition to the Rocky Mountains performed by order of Mr. Calhoun, Secretary of War, under the command of Major Long."

**Gryllus Fabr.**

1. *G. æqualis*.—Hemelytra spotted with brown; wings pale yellowish at base, with a black band and dusky tip.

Inhabits the United States.

Head varied with brown and light gray; thorax varied with brown and dull rufous, with a carinate line; hemelytra dark cinereous, with numerous unequal small dark brown spots; wings sulphurous at base, then a black band arcuated behind so as nearly to reach the inner angle; tip dark cinereous, darker at the angle, or with small fuscous spots on that part; feet pale cinereous, spotted with fuscous; hind thighs within with four black bands; posterior tibiæ sanguineous.

Length to the tip of the hemelytra, one inch and two-fifths.

Not an uncommon species. The thorax is not gradually raised into a carina, but the line is abrupt and of little elevation.

Our local form is constant in color and structure. It is, however, better described by later writers who have carefully separated the numerous species classed under the genus *Spharagemon*.

*Spharagemon bolli* appeared, from my collection, to be somewhat rare; but I may have been deceived in this, since it is not always easy to distinguish *S. bolli* from *S. collare* in flight, the color resemblance being quite marked.

*Scirtetica marmorata* is a small, clean and handsome species, and is fit companion to *Psinidia fenestralis*, with which it was found. Mr. A. P. Morse, in his "Notes on the Acrididæ of New England," published in *Psyche*, says of *S. marmorata*: "While usually recognizable by the markings of the tegmina, this species is extremely variable in color, and widely so in markings, even in the same locality, some examples being chiefly ashy, more or less maculate with black; others chiefly blackish fuscous, marked with white, yellowish or reddish brown; others, again, entirely bright rufous, sometimes of the tint of red hematite. It is one of the handsomest of our locusts, but, next to *Hippiscus rugosus*, is probably the least known of our *Ædipodinae*, since, though widely distributed, it is extremely local. \* \* I have met with it in but three localities; in each of these it is common, and is found on sandy barrens but scantily clothed with vegetation. My specimens were secured between the dates of

August 2 and September 5, at Provincetown, Mass., West Chop, M. V., and North Haven, Ct."

One female in collection is bright reddish brown; the males are "chiefly blackish fuscous, marked with white."

*Encoptolophus sordidus*, with *Dissosteira carolina*, belongs to the ubiquitous type, and by the remarkable protection gained from their ability to acquire, in general color, the particular tint of soil which they inhabit, seem destined to hold fast their numbers.

Specimens of *Psinidia fenestralis* with orange-colored wings were plentifully distributed, but none of the rose variety were met with during the season, thus proving the latter to be the exception.

I was especially pleased to note the next named trim and cool-looking locust as a resident species, though it was certainly not rare in this locality, *Circotettix verruculatus*. To capture it requires all the agility and patience of the Odonate enthusiast. When at rest upon the rocks, it is so like in appearance to their weathered surface that it is not easily discovered till startled by your approach. After a short and zigzag flight, accompanied by a loud crackling noise, it often alights in the path before you, but only to dissolve once more into the general color of the rock so quickly that the eye cannot follow.

Mr. Morse so aptly describes the haunts and mannerisms of this species, that I again quote his description,—“It is found plentifully in northern and western New England, its favorite haunts being bare ledges on elevated land and low mountains. On these it delights to bask in the sunshine, crawling about over the lichen-covered and weather-beaten rocks, with whose tints its coloring harmonizes, or to hover in the air above them, sharply stridulating. Its ‘song’ in flight is the loudest produced by any of our locusts, and consists of a series of separate notes, clicks, or snaps, not a rattle, and is readily distinguished by this peculiar snapping quality. It is one of the wariest of our locusts, being especially shy and difficult to approach during the warmer part of the day, when it often flies away to a distance of several rods and circles about, returning to the place whence it started, or dances up and down in the air, snapping loudly.”

A slight variation was noted in one specimen in collection. The usual irregular fuscous band across the middle of the wing, beyond the pale yellow disk, continued without interruption to apex. Structural characteristics were identical with other individuals.

*Schistocerca rubiginosa* was found usually perched upon low oak bushes, where its presence was easily detected by its loud stridulation. A fine, large species, not difficult to capture, and especially at home in this locality.

*Melanoplus scudderi* is the nearest approach to a wingless species yet cited within our limits. It bears marked resemblance to the *Melanopli* tribe, and might readily be mistaken for nymph, even in adult stage. I have five specimens in collection—three males, two females. The variation in body length is noticeable in both sexes.

New species added to our previous list are *Spharagemon bolli*, *Scirtetica marmorata*, *Circotettix verruculatus*, *Melanoplus scudderi*. The remainder of that list we allow to stand until further research.

In this connection we are pleased to acknowledge the addition of *Æcanthus nigricornis*, through inquiry and identification of the species by Mr. Samuel Henshaw. In his "Treatise on Insects Injurious to Vegetation," Harris writes of *Æcanthus*: "Of three species which inhabit the United States, one only is found in Massachusetts." From the description following, it would appear that he may have taken *nigricornis*, and other species, but did not consider them distinct types. Local examples of *niveus* occur uniformly ivory or pale yellowish white.



ADDITIONAL NOTES  
ON THE  
ANISOPTERA  
IN THE VICINITY OF MANCHESTER, N. H.

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BY EDWARD J. BURNHAM.

The drought that prevailed during July and August, 1900, was exceptionally severe in the vicinity of Manchester, and, following the unusually dry summer of 1899, exerted a marked effect upon the later Dragonflies. The individuals of the Gomphine and Corduline types, which emerge early in the season, were apparently as numerous as in other years; but there was a great decrease in the numbers of individuals of Aeschnines and Libellulines. A few species of the latter subfamily, notably *Libellula exusta* and *Plathemis trimaculata*, were abundant, appearing by the middle of June; but early in July the drought had dried up the smaller streams and nearly all the pools and bogs. Even such bodies of water as Stevens' Pond and Lake Massabesic were reduced several feet below their ordinary summer level, leaving great strips of marsh to dry and bake in the sun. The nymphs of *Libellula*, *Sympetrum* (*Diplax*), *Leucorhinia*, *Aeschna* and other late-appearing genera and species must have perished by thousands. A few survived, however, and when the fall rains had revived the brooks and refilled the pools, a limited number of individuals were flying about their accustomed haunts, evidently belated and hastening to complete their life-work with dispatch.

In considering how these few surviving Dragonflies came to be hovering over streams which for six weeks had shown only dry channels, we are easily tempted from the hard road of scientific investigation to the alluring bypaths of speculation; but there are a few conditions which may be accurately ascertained,

and surely an hypothesis may be permitted to stand as an hypothesis until shown to be inconsistent with known facts. The small brook, for example, that crosses Smyth Road, and beside which, in the meadows, are mud-holes formed by the removal of muck for agricultural purposes, is at least a mile and a half distant from any permanent body of water—that is, such as Dorr's or Stevens' Pond, capable of sustaining a prolonged drought. It is improbable that the few individuals of *Leucorhina intacta* and *Sympetrum rubicundulum* found here in September had journeyed so far with the benevolent purpose of restocking this insignificant and depleted little stream. Plainly, however, if these Dragonflies were not immigrants, they were of the old stock and had survived, through special fitness, in the station of their ancestors, an unusual period of drought.

The nymphs of Dragonflies, from necessity, inhabit the margins of lakes and ponds, and the portions of streams where the water is comparatively still. Clear water, with a sandy or otherwise clean bottom, is, of course, fatal to them, since they are there exposed and must soon fall a prey to fishes and to one another. When, as during the protracted droughts of 1899 and 1900, the water in a lake or pond recedes until acres of marsh are laid bare, some of the nymphs may, and doubtless do, follow the retiring water line; but it is to find dangers increasing many fold. As the character of the bottom changes, they are more exposed, and the fish are relatively more numerous by reason of the reduced area. Few Dragonfly nymphs could expect to survive under such conditions, and in a pool or brook the situation is even worse. But there have been severe droughts in this section of the country, certainly from the time when the forests were cut away, and probably for centuries before, and yet the Dragonflies remain. It is at least plausible to assume that some species have developed the capacity to lie dormant in the dried or half-dried mud until the returning water, at the end of the drought, shall revive them.

Writers upon the Odonata have commonly attributed the distribution of these insects to their powers of flight, to favoring winds, and to the transportation of eggs and nymphs by the

currents of streams ; but every careful observer knows that, with the potency of these agencies admitted, much remains to be explained ; as, for example, why certain species appear to be definitely restricted to certain stations within a given area. *Nannothemis bella* affords a striking example for the territory about Manchester. This little Dragonfly is active, is a fairly strong flyer, and remains with us in the imago stage nearly two months—from the middle of June through July and into the beginning of August ; and yet somewhat careful collecting in the vicinity of Manchester has failed to discover *Nannothemis bella* in more than one station. There individuals are numerous. The pools on the right of the road leading to Goff's Falls, near Pine Grove, are fed by cool springs which, it is believed, never fail. They certainly withstood the severe drought of last year. The water in this chain of pools is clear, but the bottom is entirely covered with a rich growth of sphagnum. Here *Nannothemis bella* has escaped the test of drought, and is it not at least possible that, lacking the capacity for survival in ponds whose margins might in any year be changed to mere mud-beds, this species long ago, after many fruitless trials at distribution hereabouts, found itself restricted to the single station where it is now found ?

But if this theory of tropical hibernation during the dry season appears somewhat fanciful when applied to New England Dragonflies, we may return to the brook on Smyth Road, and to a simple statement of facts. Last July this rivulet, along which, in ordinary years, the late-flying species of Dragonflies are abundant, shrank, first to mere puddles, and at last to an empty channel, seemingly as dry as empty. But the little stream has overhanging banks, a common characteristic of New England brooks when flowing through deep meadow land, and under these banks, in several reaches of considerable extent, the mud remained moist throughout the drought. A small number of living Dragonfly nymphs were found here on the occasion of several visits, and some of them undoubtedly survived the drouth, to emerge as the imagos observed here in September, going as contentedly about their affairs as if thousands of their companions had not perished—an example of the survival of the

fittest under the stress of extreme conditions. A similar state of things was observed along the channel of the brook which, in all but extremely dry seasons, flows from Stevens' Pond, and also along the dry course of the brook that crosses the road near Massabesic. In each case the nymphs were living, not in water, but in very moist mud, and it is probable that cannibalism had quite as much to do with the reduction of their numbers as did the failure of their water supply.

The drought that prevailed in the vicinity of Manchester during the summer of 1900 interfered seriously with the work of increasing the Institute's collection. Eight additional species of Anisoptera were secured, however, and the females of two species of which the Institute already possessed the males. The additions are as follows:

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### **Sub-Family Gomphinae.**

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#### **Tachopterix Selys.**

##### **Tachopterix thoreyi Hagen.**

Calvert, p. 241.

These Dragonflies were flying in considerable numbers on the sandy pine plains near Cohas Brook, on June 5, and two specimens were secured on the River Road North June 8. Calvert had not seen the female when he compiled his Catalogue, and he repeats the description, "Vulvar laminæ reaching base of appendages." In the specimens at hand, the vulvar laminæ nearly reach the apex of the appendages. Otherwise, the description fully corresponds.

#### **Ophiogomphus Selys.**

##### **Ophiogomphus rupinsulensis Walsh.**

Calvert, p. 242.

Not abundant, and seemingly restricted in this locality to Cohas Brook.

#### **Gomphus Leach.**

##### **Gomphus abbreviatus Hagen.**

Calvert, p. 243.

Found in considerable numbers at Cohas Brook; also near Lake Massabesic, and on the Hooksett Road.

**Sub-Family Cordulegasterinæ.**

**Cordulegaster** Leach.

**Cordulegaster maculatus** Selys.

Calvert, p. 246.

Three specimens, all males, were taken at the brook near Smyth Road on June 17. No others have yet been recognized in this vicinity.

**Sub-Family Aeschninæ.**

**Epiæschna** Selys.

**Epiæschna heros** Fabricius.

Calvert, p. 246.

This large Dragonfly is not common about Manchester, a few specimens only being secured each year. It is abundant at Hampton, and on one day in June, 1900, hundreds of imagos, not teneral, were found entangled in seaweed at York Beach. A lunch basket was nearly filled with them by a party of excursionists from this city.

**Sub-Family Cordulinæ.**

**Didymops** Rambur.

**Didymops transversa** Say.

Calvert, p. 250.

Not abundant, but seemingly widely scattered in this vicinity. It flies early in June, frequents thickets, especially along wooded roads, and very likely falls a comparatively easy prey to the birds.

**Tetragoneuria** Hagen.

**Tetragoneuria cynosura** Say.

Calvert, p. 252.

If this insect is *cynosura*, it differs from the published descriptions in that the superior appendages of the male have an acute, inferior spine at the basal third.

**Sub-Family Libellulinae.****Pantala** Hagen.**Pantala flavescens** Fabricius.

Calvert, p. 254.

As stated in Volume I. of the Proceedings of the Institute (p. 35, 1899), a male of this species was taken on an island in the Merrimack River at Amoskeag, September 6, 1898. A female was flying with the male when first observed, but escaped capture. September 17, 1900, a female, teneral, imago evidently having but recently occurred, was taken on the same island. No other individuals have yet been recognized in this vicinity, and it is probable that Manchester is near the extreme northern limit for this species in eastern North America.

**Plathemis** Hagen.**Plathemis trimaculata** De Geer.

Calvert, p. 259.

Several females of this species have been added to the collection. They were quite abundant from the first to the middle of June, being fully two weeks earlier than *Libellula pulchella*, to the females of which species they bear so strong an apparent resemblance.

**Nannothemis** Brauer.**Nannothemis bella** Uhler.

Calvert, p. 260.

This dainty little Dragonfly was found in considerable numbers at the chain of pools on Goff's Falls Road, from about the middle of June to the first of August. As stated above, it has been found at no other station near Manchester.

The list of Anisoptera in the collection of the Institute is as yet by no means complete for this vicinity, but in so far as the species have been definitely determined, it is repeated here for the convenience of members.

*Diplax* Charpentier has given place to *Sympetrum* Newman, the latter having priority and being now generally used by writers upon the Odonata.

**I. Family Aeschnidæ.**

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**I. Sub-Family Gomphinæ.**

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**1. Tachopteryx Selys.****1. Tachopteryx thoreyi Hagen.****2. Hagenius Selys.****2. Hagenius brevistylus Selys.****3. Ophiogomphus Selys.****3. Ophiogomphus rupinsulensis Walsh.****4. Gomphus Leach.****4. Gomphus nævius Hagen.****5. Gomphus abbreviatus Hagen.****6. Gomphus exilis Selys.****7. Gomphus vastus Walsh.****5. Dromogomphus Selys.****8. Dromogomphus spinosus Selys.****II. Sub-Family Cordulegasterinæ.**

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**6. Cordulegaster Leach.****9. Cordulegaster maculatus Selys.****III. Sub-Family Aeschninæ.**

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**7. Epiæschna Selys.****10. Epiæschna heros Fabricius.****8. Aeschna Fabricius.****11. Aeschna verticalis Hagen.****12. Aeschna clepsydra Say.****13. Aeschna constrictor Say.****9. Anax Leach.****14. Anax junius Drury.**

**II. Family Libellulidæ.****IV. Sub-Family Cordulinæ.****10. Didymops Rambur.****15. Didymops transversa Say.****11. Macromia Rambur.****16. Macromia illinoensis Walsh.****12. Tetragoneuria Hagen.****17. Tetragoneuria cynosura Say.****18. Tetragoneuria semiaquea Burmeister.****13. Neurocordulia Selys.****19. Neurocordulia obsoleta Say.****14. Somatochlora Selys.****20. Somatochlora lepida Hagen.****V. Sub-Family Libellulinæ.****15. Pantala Hagen.****21. Pantala flavescens Fabricius.****16. Libellula Linne.****22. Libellula cyanea Fabricius.****23. Libellula exusta Say.****24. Libellula quadrimaculata Linne.****25. Libellula semifasciata Burmeister.****26. Libellula axillena Westwood ; form incesta Hagen.****27. Libellula pulchella Drury.****17. Plathemis Hagen.****28. Plathemis trimaculata De Geer.****18. Nannothemis Brauer.****29. Nannothemis bella Uhler.****19. Celithemis Hagen.**

- 30. **Celithemis ornata** Rambur.
- 31. **Celithemis elisa** Hagen.
- 20. **Leucorhinia** Brittinger.
- 32. **Leucorhinia intacta** Hagen.
- 21. **Sympetrum** Newman.
- 33. **Sympetrum rubicundulum** Say.
- 34. **Sympetrum semicinctum** Say.
- 35. **Sympetrum vicinum** Hagen.
- 23. **Mesothemis** Hagen.
- 36. **Mesothemis simplicicollis** Say.



# **The Testudinata of New Hampshire.**

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BY WILLIAM H. HUSE.

The order Testudinata consists of reptiles with the body enclosed by two bony shields, which, in the case of all the New Hampshire turtles, are covered by hornlike plates. The carapace, or upper shield, and the plastron, or lower shield, are usually united by a bridge of bone. In two of our species they are hinged. Into the bony box composed of the two shields the extremities are withdrawn in time of danger. The carapace consists of the dorsal and sacral vertebræ, and the ribs, co-ossified with overlying bony plates. There is usually a marginal row of plates.

Turtles have no teeth. The jaws are covered with horny sheaths with sharp, cutting edges. The eye is furnished with a nictitating membrane like birds in addition to two lids. The tympanic membrane is covered by the skin. They breathe by swallowing air.

There are seven species in New Hampshire, so far as known at present. This is not a small number when the location is considered. The state is so far north that the climate is not attractive to the warmth-loving turtles. Two of the species have been found as yet in the southern part of the state only and possibly do not live beyond the northern limit of the Alleghanian province. Specimens of all the species are in the museum of the Institute.


## **I. Family Chelydridæ.**

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The members of this family have a large head and neck. The jaws are powerful and much hooked. The body is heavier forward. The tail is long with a crest of horny projections. The plastron is small and cross shaped.

### **1. Chelydra Schweigger.**

This is the only genus of this family represented in the state



and in turn has but a single species, *C. serpentina*, Linnæus. This is the largest of our turtles. It attains a length of two feet or more and specimens weighing fifty pounds have been reported. The carapace is brownish black and usually supports more or less plant life. A row of slight projections along the back, in the young, shows an attempt of the vertebræ to be visible. This disappears with age. The more prominent row on the tail has been mentioned. The plastron is yellow. This species is rarely seen on land except when the females are ready for egg-laying. The eggs are spherical and about an inch in diameter. It is variously known as Black, Mud and Snapping Turtle. The meat is highly esteemed by many.

## II. Family Kinosternidæ.

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In this family the carapace is somewhat long and narrow. The highest point is back of the middle. The plastron, in our only species, is proportionally small, the anterior portion being hinged. The anterior pair of horny plates coalesce. The head is comparatively large and pointed.

### 2. *Aromochelys*. Gray.

This is the only genus of this family and also contains but one species, *A. odoratus*, Latreille. This is the smallest turtle in the state, attaining a maximum length of about six inches, including head and tail. It is called Musk Turtle because of its odor, according to all authorities, but in this vicinity it is as nearly odorless as any member of the order. The carapace is dark brown with sometimes an olive tint that shows when the shell has been cleaned of the moss that is usually found upon it. On each side of the head are two prominent yellow stripes. This species is common though not so abundant as the next three. The eggs are nearly twice as long as thick and have very heavy shells.

## III. Family Emydidæ.

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The representatives of this family have an ovate carapace,

widest behind. The margin in some species is inclined to flare outward and upward. The plastron is large and covers the entire under side of the body. In two of our species it is hinged.

### 3. *Chrysemys* Gray.

This genus contains one species in New Hampshire, *C. picta*, Hermann. The Painted Turtle is one of our most common species. It is found everywhere in ponds, brooks and ditches. There is hardly a mudhole that does not contain at least one. The marginal plates, especially on the under side, are marked with bright red which fades away changing to yellow after death. The plastron is a rich yellow. This turtle attains a length of about eight inches. The eggs are ellipsoidal and have soft shells.

### 4. *Clemmys* Wagler.

This genus includes two species. *C. insculptus*, LeConte, or Wood Tortoise, is our only common turtle that lives exclusively on land in summer. It drinks water freely but the adults at least have no other use for it until cold weather approaches when they descend to the bottom of a pond or brook and burrow in the mud. It is a vegetable feeder. A specimen that I kept for a portion of two seasons ate nothing for a while but was brought to his appetite by ripe strawberries. After that he would eat almost any soft vegetable food. Placed in a pen with some rabbits, he repeated the old fable in a revised form by climbing the poultry netting that served as a fence and escaping while his long-legged companions stayed behind.

The carapace is somewhat carinated. The color is brown, sometimes merging into yellow. Each plate is embossed in such a way as to resemble a shell. The plastron is large and yellow with a black blotch on each plate. This species is about a foot in length when full grown. The eggs are ellipsoidal, with rather thin shells though not so soft as those of the previous species.

*C. guttatus*, Schneider, is commonly known as the Spotted Tortoise. Its black carapace with numerous yellow spots, varying

much in number, distinguishes it from other species. It is found everywhere, associated with *Chrysemys picta*. It is a little smaller than its companion but similar in its habits.

### 5. *Emydoidea* Gray.

This genus contains the species *E. blandingi*. On June 23, 1900 a specimen of this species, Blanding's Box Turtle, was found in the southern part of Manchester near Cohas brook and brought to me. Dekay, in his Zoology of New York, published in 1842, says that the tortoise was found in Haverhill, N. H. by Dr Storer, but in the latter's report on the reptiles of Massachusetts he speaks of a specimen being sent him from "Haverhill" in such a connection that it is probable that he meant Haverhill, Mass. If this be true the specimen brought to me was the first one found in New Hampshire of which there is any record.

The shell is seven and a half inches long and five inches wide. The carapace is black, each plate being covered with small, light yellow spots, smaller and more numerous than those of the Spotted Tortoise. These are distributed somewhat irregularly, but seem to radiate from the posterior side of the middle row of plates and the inner posterior of each lateral plate. The plastron is light yellow with a black blotch in the outer posterior corner of each plate. The head and neck are black above and yellow beneath, the yellow extending back nearly to the shell. This color is one of the most conspicuous things about the turtle. A notch in the front of the upper jaw is quite noticeable. The neck can be stretched out to the length of five inches. The skin of the neck and flanks is rough, that of the legs, imbricated. The tail is rather long. The plastron is hinged near the middle and again to the carapace so that the two shells can be shut, enclosing the extremities. In this specimen the protection is not complete, the limbs being too large to be all enclosed at once.

Since the above mentioned specimen was found two more have been brought to me. One was found in Manchester, the other in Auburn. The larger of these is of the same size as the one described and as it bears evidence of age it is probable that this is about the maximum size. The spots on the carapace are rather

indistinct. The other specimen is smaller with brighter spots. Both are better able to cover their extremities with the closed shell than the first one found.

#### 6. *Terrapene* Merrem.

This genus is represented by *T. carolina*, Linnæus, or Box Turtle. It is nearly hemispherical in shape. The carapace is brown, nearly black, with irregular yellow markings, and is inclined to be carinated. The two shells are hinged like those of the last named species but more perfectly. They fit more tightly together, completely shutting in the unprotected parts of the body. The only New Hampshire specimen I have seen came from Pelham. It has been reported from Lee.



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MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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**SECTION C.**  
**BOTANY.**

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**Officers for 1900.**

MRS. ALBERT O. BROWN, *President.*  
MISS CAROLINE E. WING, *Vice President.*  
F. W. BATCHELDER, *Secretary.*  
MISS ELLEN F. WIGGIN, *Treasurer.*

**EXECUTIVE COMMITTEE.**

MISS ELLEN F. WIGGIN,    REV. CHAS. J. STAPLES,  
MISS CAROLINE E. WING.

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## SECTION C. BOTANY.

### REPORTS OF MEETINGS.

Tuesday evening, January 2. Regular meeting. Adjourned to January 16.

Tuesday evening, January 16. Regular meeting. Adjourned to January 30.

Tuesday evening, January 30. Regular meeting; the President in the chair. The Executive Committee reported that provision had been made for the work of the meetings of February 13 and 27, and that a plan of work for the season was under consideration. The committee recommended that the Section make a special study of the orders Filices and Orchidaceæ.

After the transaction of business the members listened to a paper on the "Ferns of New England," by Mrs. Batchelder, illustrated with mounted specimens and also the plates in "Eaton's Ferns," the latter having been kindly loaned by the City Librarian.

Tuesday evening, February 13. Regular meeting; the President in the chair. A severe storm prevailing, very few members were present and the meeting was informal. Mrs. Maria L. Clough had prepared a paper entitled "A Study in Mycology," but in the circumstances it was deemed best to postpone the reading of it till the next meeting.

Accordingly adjourned to February 27.

Tuesday evening, February 27. Regular meeting; Rev. Charles J. Staples in the chair. There being no business to transact, the members gave their attention to the reading of the paper by Mrs. Clough on "A Study in Mycology," deferred from the last meeting.

Adjourned to March 13.

Tuesday evening, March 13. Regular meeting; the Vice

President in the chair; Miss Lucy Maud Hope, Secretary pro tem. Mrs. Clough led the Section in a study of the life history of ferns, touching upon the place of these plants in the vegetable kingdom, their method of development and the "alternation of generations," which they illustrate so perfectly.

The chapter on "Fertilization, Development and Fructification," in the recently published book, "How to Know the Ferns," by Mrs. Frances Theodora Parsons, was read and discussed. Various terms used in the study of ferns were explained and illustrated by means of pressed specimens. A microscopic examination of fresh prothallia followed.

By special request Mr. Burnham gave a talk on orchids. Alluding to the interest which this class of plants has excited in recent times, he told of the perils which botanists have faced in the search for new species; also of the immense sums spent by wealthy Englishmen for rare specimens. Special attention was called to the Lady-slipper (*Cypripedium*), which depends upon one particular kind of insect for its fertilization. Incidentally comparison was made with the mayflower, which is now in a state of transition, some of its blossoms being self-fertilized, while others, those showing the brightest pink hue, are the products of cross-fertilization. Reference was also made to the columbine as being in danger of extermination because a certain beetle gathers the honey from the outside of the spurs without visiting the interior of the blossom.

Adjourned to March 27.

Tuesday evening, March 27. Regular meeting; Miss Susy C. Fogg in the chair. There being no business to transact, the members gave their attention to a talk by Mr. Batchelder on the "Life History of Ferns."

Ferns were first considered biologically, as aggregates of cells; then the successive steps of their development as plants, simply, were traced, the first step being the formation of a nucleus in a mass of hitherto undifferentiated matter; next, the formation of a cell wall, i. e., separation; next, division of cells and consequent multiplication, by which last process all plants, however large, are built up. The individual plant, thus start-

ed on its career, becomes further modified by differentiation, specialization, elimination, adaptation, and so on.

The polymorphism of the individual was next taken up and it was shown how, as in entomology individuals are subject to metamorphosis, as it is called, so in botany there are two or more stages in the life history of plants. These stages are usually called "alternation of generations," i. e., an alternation of non-sexual with sexual generation, in which the products of one process differ from those of the other. Then followed an account of the discovery of the process of reproduction in ferns, and credit was given to Nageli, who, in 1844, found the antheridia, and Suminski, who, in 1848, found the archegonia. The terms gametophyte and sporophyte were explained, and it was stated how closely the gametophyte in the Pteridophytes resembles the liverwort in the Bryophytes.

By means of a diagram on the blackboard, the derivation of the Pteridophytes was indicated and the probable derivation and relations of the several orders in the sub-kingdom traced. The Equisetaceæ, Lycopodiaceæ and Ophioglossaceæ were described as very ancient forms, plants allied to the Lycopodiaceæ being the probable source of the Gymnosperms, and plants allied to the Ophioglossaceæ being the probable source of the Angiosperms, while the Equisetaceæ and their allies failed to develop into higher forms. The Osmundaceæ were described as a connecting link between the Ophioglossaceæ and the more modern forms, the sporangia being derived partly from epidermal cells and partly from the interior tissue of the leaf, instead of being derived wholly from the interior tissue, as in the Ophioglossaceæ, or wholly from epidermal cells, as in the Polypodiaceæ.

Adjourned to April 10.

Tuesday evening, April 10. Regular meeting; the President in the chair. After routine business the evening was devoted to the study of Buds, Aments and Catkins, specimens being shown from various species of trees and shrubs.

Adjourned to April 24.

Tuesday evening, April 24. Regular meeting; the President

in the chair. After routine business the time was devoted to the subject of pressing and mounting specimens, and practical illustrations were given.

Adjourned to May 8.

Tuesday evening, May 8. Regular meeting; the President in the chair. After routine business the members engaged in the study of the order Ranunculaceæ. Owing to lack of fresh specimens by reason of the backwardness of the season, herbarium specimens were used. A general view of the order was presented with the help of Gray's Manual and Britton and Brown's Illustrated Flora. Known stations of local plants were named and the members of the Section were earnestly requested to make collections during the coming season, so that at its close the order may be fairly well represented in the herbarium of the Institute. Full collections of the local ferns and orchids were also strongly urged, since those plants have been designated as special objects of study during the season.

Adjourned to May 22.

Tuesday evening, May 22. Regular meeting; the President in the chair; Miss Hope, Secretary pro tem.

The Executive Committee reported that provision had been made for the work of the meetings before vacation as follows: May 22, analysis of flowers of the season; June 5, a quiz on botanical terms used at last meeting; June 19, review of work up to date.

The President gave a brief talk on the typical flower considered as a modified branch of the plant, with description of parts and explanation of technical terms. The members then proceeded to the practical analysis of *Anemone nemorosa* and *Coptis trifolia*.

Adjourned to June 5.

Tuesday evening, June 5. Regular meeting; the President in the chair; Miss Hope, Secretary pro tem. After routine business a short time was devoted to the analysis and comparison of *Viola blanda*, *cucullata*, *sagittata* and *canina*. Then the practical work with the ferns was begun, being introduced by the President with an explanation of technical terms. Microscopic

examination was made of the sori and indusia of *Dryopteris marginalis*.

Adjourned to June 19.

Tuesday evening, June 19. Regular meeting; the President in the chair; Miss Hope, Secretary pro tem. This being the last meeting before the summer vacation, members were again urged to make collections for the herbarium, the President expressing the hope that each member would donate at least one specimen collected during the summer season.

The remainder of the time was spent in the analysis of *Virburnum cassinoides* and *Asplenium Filix-femina*, and the examination of the silex skeleton of *Equisetum hyemale* prepared by Mr. Huse.

Adjourned to October 2.

Tuesday evening, October 2. Regular meeting; the President in the chair. The report of the last meeting previous to vacation, prepared by Miss Hope, Secretary pro tem., was read and approved. An exceptionally fine specimen of *Liatris scariosa* was exhibited and the flowers analyzed. Ferns and Fern-Allies having been selected as objects of study for the present, several species were shown and an informal discussion was held.

Adjourned to October 16.

Tuesday evening, October 16. Regular meeting; the President in the chair. The Executive Committee reported they had arranged a program for work during the remainder of the year on Ferns and Fern-Allies, as follows: October 16, the genus *Dryopteris*; October 30, the genus *Asplenium*; November 13, *Ophioglossum* and *Botrychium*; November 27, *Equisetum*; December 11, *Lycopodium*.

The Executive Committee further reported, concerning certain proposed lectures, that they had communicated with Professor Weed of the New Hampshire College and ascertained his terms. Further time was asked and granted for communication with Mr. Fernald of the Gray Herbarium with regard to his terms.

The genus *Dryopteris* was then taken up and studied with

the aid of fresh specimens of *D. acrostichoides*, *marginalis*, *spinulosa intermedia* and *Bootii*.

Adjourned to October 30.

Tuesday evening, October 30. Regular meeting; the President in the chair.

The Executive Committee having reported the result of their communication with Mr. Fernald, it was, after some discussion, voted that he be engaged to deliver two or more lectures, provided the requisite funds could be obtained. It was then voted that a committee of five be appointed by the chair to solicit subscriptions, and the chair accordingly appointed such committee.

The study of Dryopteris, begun at the last meeting, was then resumed and specimens of all the local and some other species examined. The study of the genus *Asplenium* was then begun, specimens of the two local species, *A. Filix-femina* and *A. acrostichoides* (*thelypteroides*), being exhibited; also several species in the herbarium, among which were *A. platyneuron* (*ebeneum*) and *A. Trichomanes*, found in adjoining towns.

Adjourned to November 13.

Tuesday evening, November 13. Regular meeting; the President in the chair.

The committee appointed at the last meeting to solicit funds to meet the expense of a course of lectures reported that a small amount had been subscribed. The amount being insufficient for more than one lecture a discussion ensued as to the advisability of giving that one. After a free expression of opinion by all the members present, it was decided that in consideration of the number of lectures already arranged for and to be given by the Institute, and also of the difficulty in raising sufficient funds for the lectures proposed, it would be wisest to drop the matter for the present. Accordingly it was voted that the project for a course of lectures to be tendered by Section C. to members of the Institute, be indefinitely postponed.

The family Ophioglossaceæ was then studied with the aid of herbarium specimens of *Ophioglossum vulgatum* and *Botrychium*

*Virginianum* and fresh specimens of *B. ternatum* of the varieties *intermedium*, *obliquum* and *dissectum*.

Adjourned to November 27.

Tuesday evening, November 27. On account of inclement weather there was not a quorum in attendance and no business was transacted. Those present studied the genus *Equisetum* with the help of herbarium specimens, particularly those of *E. fluviatile* (*limosum*).

Adjourned to December 11.

Tuesday evening, December 11. Annual meeting; the President in the chair; Mrs. Batchelder Secretary pro tem.

After the reading of the reports of the last two meetings and of the annual report of the Secretary, the Section proceeded to the election of officers for the coming year. It was voted that a nominating committee be appointed by the chair. Accordingly the chair appointed Mrs. Williams, Miss Wiggin, and Miss Tuttle. This committee, after consultation, brought in the following list of officers of Section C, for the year 1901:

*President*—Mrs. Albert O. Brown.

*Vice President*—Miss Caroline E. Wing.

*Secretary*—Mr. F. W. Batchelder.

*Treasurer*—Miss Ellen F. Wiggin.

*Executive Committee*—Miss Caroline E. Wing, Rev. Charles J. Staples, Miss Isabelle R. Daniels; the President and Secretary *ex officio*.

It was voted that the Secretary cast one ballot for the foregoing list, which having been done, the persons named were declared duly elected.

The plan of work for the coming year was then discussed. At the request of the President Mr. Burnham spoke of microscopic work in connection with botanical study, with reference to the tissues and the reproductive organs of ferns and also the development of buds. He also kindly offered his microscope and slides for use at future meetings.

Adjourned to January 8, 1901.

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## INTRODUCTORY.

REPRINTED FROM VOLUME I. 1899.

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The botanists of Dartmouth College in New Hampshire and of Amherst College in Massachusetts in the publication of their local floras defined their areas as circles with a radius of thirty miles from Hanover and Amherst respectively. It will be advantageous to define at the outset what shall be the working area, botanically of the Manchester Institute. Certain natural and artificial boundaries suggest themselves, within which there is plenty of room, abundance of material and the certainty of not interfering with or being crowded by workers in other areas. Broadly speaking, then, we claim as our proper area the whole of Hillsborough county, the west half of Rockingham county and the south half of Merrimack county. In other words this area may be described as bounded on the west by the Connecticut valley watershed, on the south by the state line, on the east by the Atlantic watershed and on the north by the arc of a circle drawn through Merrimack county with a radius of twenty-five miles from Manchester.

The Preliminary List is precisely what its title implies, the first step towards the goal that is set before us. The most of it is drawn from the observations and collections of the compiler, whose researches have been principally confined to the towns of Pelham and Hudson, Manchester and adjoining towns, and Concord. The intention is to extend observations as soon as may be over the whole area named, and in this work the assistance of all persons interested is solicited. Communications and specimens forwarded to E. J. Burnham, Corresponding Secretary of the Institute, Manchester, N. H., will receive due consideration.

The arrangement of families is that of Engler and Prantl, the great German systematists. The nomenclature is that of Gray's Manual, sixth edition, except in certain families where for good and sufficient reasons the use of a later nomenclature appeared to be preferable.



# ADDITIONS TO THE PRELIMINARY LIST of PLANTS.

COMPILED BY FREDERICK W. BATCHELDER.

*Note*—Circumstances prevented the anticipated enlargement of the Preliminary List of 1899 by observations and collections during the year 1900. Consequently the only additions are a single grass, two species of cruciferous plants, and the genus *Lobelia*, which was accidentally omitted from the original list.

## Gramineæ.

**Eragrostis Frankii** Steud. Manchester. Rare.

Growing near the track of the newly constructed electric road from Manchester to Goffstown. Probably an immigrant from the West or South.

## Cruciferae.

**Cardamine Pennsylvanica** Muhl. In wet places.  
**flexuosa** With. In swamps.

## Campanulaceæ.

**Lobelia Dortmanna** L.

	Sandy borders of ponds.	Not rare.
<b>cardinalis</b> L.	Common along stony streams.	
<b>spicata</b> Lam.	In dry fields.	Common.
<b>inflata</b> L.		Very common.

## SUMMARY

1899—1900.

Number of Families represented.....	115
Number of Genera represented.....	370
Number of Species named.....	811
Number of Varieties named.....	13
Total number of names.....	824

[illegible]

1. *Chlorophyll a* and *Chlorophyll b* were determined by the method of Arar and Collins (1971).

the 1990s, the number of people in the world who are illiterate has increased from 1.2 billion to 1.5 billion. The number of illiterate people in the world is projected to reach 1.7 billion by the year 2015. The number of illiterate people in the world is projected to reach 1.7 billion by the year 2015. The number of illiterate people in the world is projected to reach 1.7 billion by the year 2015.

1. *Journal of the American Medical Association*, 1990; 263: 1025-1028.

the 1990s, the number of people in the United States who are 65 years of age or older is projected to increase from 20 million to 30 million, and the number of people 75 years of age or older is projected to increase from 10 million to 15 million (U.S. Census Bureau, 1997). The number of people 85 years of age or older is projected to increase from 2 million to 4 million (U.S. Census Bureau, 1997). The number of people 90 years of age or older is projected to increase from 500,000 to 1 million (U.S. Census Bureau, 1997). The number of people 95 years of age or older is projected to increase from 100,000 to 200,000 (U.S. Census Bureau, 1997). The number of people 100 years of age or older is projected to increase from 10,000 to 20,000 (U.S. Census Bureau, 1997).

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1. *Journal of the American Medical Association*, 1990; 263: 1025-1028.

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MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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**SECTION D.**

**ORNITHOLOGY.**

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**Officers for 1900.**

MRS. F. W. BATCHELDER, *President.*

MRS. J. C. BICKFORD. *Vice President.*

MISS MAY W. DAVIS, *Secretary.*

MISS THEODORA RICHARDSON, *Treasurer.*

**EXECUTIVE COMMITTEE.**

EDWARD H. FOGG, MISS THEODORA RICHARDSON.

MRS. J. C. BICKFORD.

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## SECTION D---ORNITHOLOGY.

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This Section was organized February 15th, 1899, and admitted to the Institute January 17, 1899.

It has for its objects the systematic study of the structure and life-history of birds in general and the observation, record and classification of the avifauna of Manchester and vicinity. Special subjects for investigation will be the distribution of species locally with relation to climatic, geologic and floral conditions, the habits of birds, their food in its relation to insect pests, and thereby to agriculture, their songs and calls, their variations—in short, anything which may increase our knowledge of their life-histories and of the links which join them to the lower and higher animals and to man.

Two important collateral branches of work will be these: First, the collection of a local museum of ornithology, in which, in the course of time, all the species incident to the region shall be represented by mounted specimens and skins prepared according to the latest and most approved methods; second, the compilation of as full a list as possible of resident, migrant, visitant and accidental species. The list will of necessity be at first a modest one. The addition of supplements annually will render practicable at no distant date the publication of a list more nearly commensurate with our ambition and with the avian wealth of an exceptionally favored locality.

The situation of Manchester is favorable to variety in its fauna no less than in its flora. The overlapping of the Boreal and Alleghanian areas gives rise to a corresponding overlapping of the breeding ranges of various species of birds. In illustration and proof of this may be cited the fact that the breeding range of the wood thrush extends not less than twenty miles north and of the hermit thrush not less than twenty miles south of Manchester, and that the white-throated sparrow or peabody bird is a summer resident.

In order to systematize the results of observation a perpetual bird-calendar is kept by members specially appointed from time to time, who incorporate with their own observations, those of all the other members. Field-days are held at the pleasure of the section. Two were held this year and proved to be equally enjoyable and profitable.

# LECTURES.

OF A COURSE

SIX LECTURES BY MR. RALPH HOFFMANN,

OF BOSTON, MASS.

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The last three lectures in this course were delivered after the first of January, 1900.

The following were the dates and subjects :

January 12, 1900. Swallows and Sparrows. .

February 9, 1900. Blackbirds, Flycatchers and Woodpeckers.

March 9, 1900. Birds of Prey, Game Birds and Water Birds.

This course of lectures proved to be even more interesting and successful than was anticipated. The constantly increasing attendance and the evident interest manifested bore sufficient testimony to their excellence.

Mr. Hoffmann's enthusiasm is reinforced by sound judgment and by the power to win at once the attention and sympathy of his audience.



## SECTION D.

# ORNITHOLOGY.

### REPORTS OF MEETINGS.

Wednesday evening, January 10. Regular meeting. The fourth lecture by Mr. Ralph Hoffman in the course tendered to the Institute by this Section having been assigned for Friday evening, the 12th, the meeting voted to adjourn without further business. Accordingly adjourned to January 24.

Wednesday evening, January 24. Regular meeting; the President in the chair. Number of members present, 23. The reading of the records of the meetings of December 27, 1899, and January 10, 1900, were read and approved.

The President offered suggestions relative to the observation and study of birds in the coming season, as follows:

1st—to record date of observation.

2d—time of day.

3d—place of observation.

4th—nature of locality.

5th—number of birds.

6th—if possible, note number of male and female and immature.

7th—compare number of males and females.

8th—note what doing, and if feeding, upon what.

9th—calls and songs.

10th—any special or unusual circumstances.

The bird calendar to date was presented by Mr. Batchelder, who remarked upon the mildness of the season and the unusual number of birds seen in this locality. Following is the list: House sparrow, crow, blue jay, goldfinch, downy woodpecker, ruffed grouse, chickadee, butcher bird, pine grosbeak. Mr. Herbert E. Richardson reported a flock of red-poll linnets seen on January 21. Mr. Fogg reported a small flock of red cross-bills seen January 3, and a hairy woodpecker January 5. Mrs.

Lockhart and Mr. Batchelder were appointed to prepare the calendar for the next meeting.

Mr. Batchelder, having been appointed at the meeting of September 20, 1899, to present a comparison between the local list of birds thus far observed and Chapman's Handbook, gave his report accordingly. Following this, he gave an explanation of the names of orders and families in ornithological nomenclature.

Adjourned to February 21.

Wednesday evening, February 21. Regular meeting; number of members present, 19.

The matter of ornithological magazines and periodicals to be subscribed for was discussed and was referred to the Executive Committee. A plan for field days and a Summer School in connection with the Institute was brought before the meeting and explained by Mr. Clough, the President of the Institute, and by Mr. Burnham, the Corresponding Secretary. Saturday, March 31 was selected as the date for the first field meeting of Section D in connection with the Summer School. For reports of this and subsequent field meetings see special report of Summer School.

In the absence of Mrs. Lockhart, Mr. Batchelder reported the calendar, adding six species to the twelve hitherto reported, as follows: January 28, tree sparrow; February 2, Bohemian waxwing; February 6, junco; February 11, red-breasted and white-breasted nuthatches; February 20, white-winged crossbill. The last-named species had been reported on October 6, 1899, and occasionally during the remainder of the year. On February 20, 1900, they appeared in numerous flocks. Most of those observed were feeding upon the seeds of the Norway spruce. The pine grosbeaks have continued to be abundant, the males being to the females in about the proportion of one to six. Two of the Bohemian waxwings were observed in such favorable conditions as to leave no room for doubt in the mind of the observer. As no specimens were taken, he naturally hesitates to offer his report as absolute and final.

Mr. Herbert Richardson and Mrs. Varick were appointed to prepare the calendar for the next meeting.

The members gave their attention to a paper by Miss Amelia Graupner on "The Food Habits of Birds." The subject was considered from the economic standpoint and was illustrated by a carefully prepared chart showing the per cent of animal and vegetable food in the diet of birds. The paper was divided into the following sections: 1st. The paramount service of birds lies in their power to destroy insects. 2d. Many species perform an inestimable service by destroying the seeds of harmful plants. 3d. Birds do not naturally select the products of cultivation for food, but prefer the food supplied by wild plants. It is only when deprived of their natural food supply that they attack the fruits of garden or orchard.

Adjourned to March 21.

Wednesday evening, March 21. Regular meeting; number of members present, 14.

Miss Theodora Richardson, having been appointed by the Council as Instructor in Ornithology for the Summer School, gave notice of a field meeting to be held at Auburn on the 31st day of March.

The calendar was presented by Mr. Richardson. A paper was read by Miss Mary F. Dana on the "Theory of Migration of Birds." Following is an abstract:

Birds are divided into three classes: Those which arrive in spring and remain through the summer; those which arrive in the fall and remain through the winter; those which are with us but twice a year and are called birds of passage. Besides these are the partial migrants and the permanent residents, the latter changing their location more or less as the necessities of food supply or of incubation may decide.

Several theories of the cause of migration were considered, such as variations in temperature, scarcity of food supply, geologic and climatic changes and the selection of safe breeding places. To sum up—the mysterious phenomena and the marvelous powers of the bird world are by most students brought to rest upon the foundation of practice, habit and the survival

of the fittest. Leading ornithologists believe that birds follow landmarks known by sight, as coast lines, mountains and river valleys.

After a discussion of the theories advanced, the meeting adjourned to April 18.

Wednesday evening, April 18. Regular meeting; number of members present, 9.

The calendar of birds was read, the recent additions being these—robin, bluebird, song sparrow, American merganser (flock of 50 or more), brown creeper, red shouldered hawk, fox sparrow, meadow lark, phoebe, purple finch, flicker, redwing.

Mr. Fogg read a paper on "Bird Localities." He suggested that bird students dress as inconspicuously as possible when out for observation in wood or field. He described different kinds of localities and named the kind of birds likely to be found in each, e. g., thrushes and tanagers in woods, bluebirds and purple finches in orchards, sparrows and Maryland yellowthroats in bushy pastures and swampy clearings.

Mr. Fogg and Mrs. Lockhart were appointed to prepare the calendar for the next meeting.

Adjourned to May 2.

Wednesday evening, May 2. Regular meeting; the President in the chair. Number of members present, 9. Mrs. Lockhart presented the calendar, with these additions to the previous list, chipping sparrow, yellow-rumped warbler, yellow warbler, cowbird, vesper sparrow. Mr. Batchelder added kingfisher, blue-headed vireo, field sparrow, swift, hermit thrush, parula warbler, and Mr. Fogg added white-throated sparrow, house wren, bob-white, pine warbler, wood pewee, golden-crowned kinglet, white-eyed vireo.

The members gave their attention to an explanation by Mr. Batchelder of the derivation and meaning of the generic and specific names in ornithology.

Adjourned to May 16.

Wednesday evening, May 16. Regular meeting; the Vice President in the chair.

The calendar, reported by Miss Barnes and Miss Hope, was

of unusual interest, as will be seen from the following list of additions—brown thrasher, chebec, kingbird, yellow-throated vireo, Baltimore oriole, rose-breasted grosbeak, white-crowned sparrow, indigo bird, white-bellied swallow, catbird, Wilson's thrush, chewink, least sandpiper, spotted sandpiper, bobolink, humming bird, olive-backed thrush, black-billed cuckoo, night-hawk, Wilson's plover, wood thrush, olive-sided flycatcher, purple martin, cedar bird, gray-cheeked thrush, and these warblers: black-throated green, black-throated blue, Blackburnian, Magnolia, chestnut-sided, oven bird, water thrush, redstart, Maryland yellow-throat, black-poll, black-cap, Canadian, golden-winged, yellow-palm, palm, Nashville, Cape May; also the blue-gray gnatcatcher.

The golden-winged, palm, Nashville and Cape May warblers and the blue-gray gnatcatcher had never before been reported from this section of the state. [See Notes to Additions to Preliminary List of Birds during 1900.]

Miss Fogg and Miss Daniels were appointed to prepare the calendar for the next meeting.

The members gave their attention to a talk by Mr. Wm. H. Huse on "Ornithology in the Public Schools," with appropriate illustrations by means of lantern slides.

Adjourned to May 30.

Wednesday evening, May 30. Regular meeting.

Adjourned to June 13.

Wednesday evening, June 13. Regular meeting; Mr. Fogg in the chair.

It was voted that when the meeting adjourned it should be till the call of the President after the summer vacation.

Mr. Herbert Richardson gave a talk on "Reminiscences of Early Days in Birds' Nest Hunting and Eggs Which I Have Seen." Mr. Fogg spoke of the present year being very remarkable for the great numbers of birds recorded and especially for the number of species observed which had not been hitherto reported for this vicinity.

Mrs. McLeod, who resides in a very favorable locality a little

out of the city, reported having made observation of 84 species of birds since the first of January.

Adjourned to the call of the President.

Monday evening, October 9. At the call of the Presidents of Sections B and D a joint meeting of those Sections was held to consider the advisability of combining the work of the Sections for the remainder of the year.

It was voted that a committee of three be appointed by the chair to arrange the work of these meetings for alternate Monday evenings beginning with Monday evening, October 22. The chair accordingly appointed Mr. E. J. Burnham, Mr. Edgar D. Cass and Mr. A. L. Clough.

Mr. Burnham gave a talk leading up to the classification of animal life, beginning with the cell.

It was announced that the subject of the next meeting would be "The Backbone."

Adjourned to October 22.

Monday evening, October 22. Joint meeting of Sections B and D.

Dr. Bullock gave a talk upon "The Backbone," illustrated with specimens of human vertebræ; also with those of cats, birds and fishes. A live snake, the puffing adder, was exhibited by Mr. Huse. Mr. Burnham spoke on the new classification according to Professor Jordan's Manual, and suggested that the Section make use of that book in study.

Adjourned to November 5.

Monday evening, November 5. Joint meeting of Sections B and D.

The evening was devoted to the study of Jordan's classification and nomenclature, with special reference to the dentition of the Mammalia.

Adjourned to November 19.

Monday evening, November 19. Joint meeting of Sections B and D.

Subject of study: Dentition of Vertebrates. The Theory of Cranial Development was presented by Mr. Burnham. Follow-

ing this, various skulls and vertebræ were examined and classified.

Mrs. Batchelder, who was a delegate from the New Hampshire Audubon Society to the combined meetings of the American Ornithologists' Union and the Audubon Societies held at Cambridge November 15, gave a report of the meetings. She spoke particularly of the results already accomplished in the line of bird protection along the coast from Virginia to Maine, and of the further good results to be expected from the passage by Congress of the Lacey Bill last May.

Adjourned to December 3.

Monday evening, December 3. Joint meeting of Sections B and D.

Adjourned to December 12.

Wednesday evening, December 12. Annual meeting; the President in the chair. In the absence of the Secretary, Miss Theodora Richardson was appointed Secretary pro tem. The annual report of the Secretary was then read and approved.

It was unanimously voted that that part of the Secretary's report which referred to the death of Mr. William Ellery Moore, one of our most earnest members, be forwarded in a fitting manner to Mrs. Moore. Mr. E. H. Fogg, as Chairman of the Executive Committee, gave a report of the joint meeting of the Executive Committees of Sections B and D. In accordance with their recommendation it was unanimously voted that for the next six meetings this Section continue to work in conjunction with Section B, with Mr. Edward J. Burnham as leader, following the line of study already begun.

The chair appointed a nominating committee, consisting of Mr. Edgar D. Cass and Miss M. Eugenia Lord, to bring in a list of officers for the year 1901. The committee reported the following list of names:

*President*—Mrs. Annie V. Batchelder.

*Vice President*—Mrs. Emma L. Bickford.

*Secretary*—Miss May W. Davis.

*Executive Committee*—Mr. Edward H. Fogg, Miss Theodora Richardson, Mrs. Emma L. Bickford.

It was voted that the Secretary cast one ballot for the foregoing names, which having been done the persons named were declared elected.

The President described the "Lacey Act," passed by Congress last May, as being a measure intended to supplement existing State laws and to regulate inter-state commerce in game, and also as marking the beginning of a new era in bird protection.

Adjourned to December 17.

Monday evening, December 17. Joint meeting of Sections B and D. Continuation of study of Jordan's Manual.

Adjourned to December 31.

Monday evening, December 31. Joint meeting of Sections B and D. Continuation of study of Jordan's Manual.

Adjourned to January 14, 1901.

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## ADDITIONS TO THE PRELIMINARY LIST OF BIRDS.

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**528b. *Acanthis linaria rostrata* (Coues).**

GREATER REDPOLL.

Abundant in the winter of 1899-1900. (See Note 2 below)

**642. *Helminthophila chrysoptera* (Linn.)**

GOLDEN-WINGED WARBLER.

A few observed in May, 1900. (See Note 3 below)

**645. *Helminthophila ruficapilla* (Wils.)**

NASHVILLE WARBLER.

Abundant in May, 1900. (See Note 3 below)

**650. *Dendroica tigrina* (Gmel.)**

CAPE MAY WARBLER.

Abundant in May, 1900. (See Note 3 below)

**672. *Dendroica palmarum* (Gmel.)**

PALM WARBLER.

Abundant in May, 1900. (See Note 3 below)

**751. *Polioptila cærulea* (Linn.)**

BLUE-GRAY GNATCATCHER.

Observed May 10, 1900. (See Note 4 below)

## Notes to Bird List.

## NOTE 1.

**357. *Falco columbarius* (Linn.) PIGEON HAWK.**

Common transient visitant.

(Erroneously reported in the Preliminary List, Vol. I, 1899, as a common summer resident.)

## NOTE 2.

**Winter Visitants, 1899--1900.**

The winter of 1899—1900 was remarkable for the large number of winter visitants observed, some of them being rare and some never before recorded from our area. The White-winged Crossbills, which were recorded at Manchester October 16, 1899 and frequently observed during the remainder of the year, appeared in larger numbers early in January, 1900, the maximum number occurring about February 20, after which the number rapidly diminished until their final disappearance in the spring. These Crossbills were seen oftenest feeding on seeds from the cones of the Norway spruce. The proportion of males to females was about one to four. Their call notes and flight notes were very sweet and characteristic but are not easily described.

The Pine Grosbeaks were abundant all winter. The proportion of males to females was about one to seven, and the number of birds seen together ranged from two to thirty. On one occasion they were seen to associate quite freely with a pair of butcher birds, as if not in the least troubled by the carnivorous propensities of the latter.

The Red-poll Linnets were also very abundant. In addition to the typical *Acanthis linaria* there were also numbers of the variety *A. l. rostrata*, especially toward spring. In the middle of the winter there was certainly at least one other species, probably *A. hornemannii exilipes*, and some of these were so much

larger than others as to suggest the possibility of their being *A. hornemannii* on a visit from Greenland. As no specimens were taken the compiler has not presumed to put these last two on record. Concerning *A. l. rostrata* there can be no question.

NOTE 3.

**On the Migration of Warblers Observed in May, 1900.**

The month of May, 1900, was remarkable for the extraordinary incursion of warblers, including several species never before reported in our area. Soon after the first of the month the birds were observed to be unusually abundant. By the 9th the numbers, both of common and rare migrants, surpassed the record of any previous year. The first new record was that of the Palm Warbler on the 9th. On the 10th were also recorded for the first time the Nashville and Cape May Warblers, and a few days later the Golden-winged Warbler. All these species were observed in greater or less numbers for about two weeks, the maximum number occurring about the 12th. Soon after this date another extraordinary succession of events occurred. Day after day great numbers of warblers were found dead. Into one of the public schools the children brought "a basketful" of them, about three dozen, as I was afterwards informed by one of the teachers. Into another school nearly as many were brought and a number were sent to a taxidermist to be mounted. Among these birds were the following eight species: Maryland Yellowthroat, Redstart, Parula, Chestnut-sided, Blackburnian, Magnolia, Canadian and Nashville. Examination of the stomachs of these birds indicated that they had not been able to procure their requisite amount of food and had starved to death. The occurrence of an unusually cold wave on the 11th and 12th and a subsequent succession of cold, rainy days may account for the facts in the case of those visitants who were off their accustomed track and whose supply of insects may have been cut off temporarily by the weather. The fatality in the cases of the ordinary residents, like the Redstart and the Maryland Yellow-throat, hardly seems as easy of explanation.

Observers in Franklin, some 40 miles further north, reported precisely similar occurrences. Not only were the warblers in great numbers but they were apparently very tame, feeding about yards and particularly the foundations of houses, and great numbers were found dead.

NOTE 4.

**A Blue-gray Gnatcatcher in New Hampshire.**

On the 10th of May two observers, while watching a flock of visitant warblers, saw flying about a shrub close by, what they took at first glance to be a kinglet. A second look showed that though the bird was as small as the kinglets the color was entirely different, the upper parts being distinctly bluish gray instead of olive green. Presently the bird displayed his tail with the utmost deliberation several times, showing the outer feathers white, the others changing gradually until the middle ones were entirely black. Of course it could be nothing but the Blue-gray Gnatcatcher, never yet, so far as we know, reported from this State. The bird came finally so near that he could almost have been caught in the hand. Meanwhile Chapman's Manual had been brought from the house and every point of the bird was compared with the printed description. In the circumstances, therefore, it seems right to make the record positive, though the single specimen was allowed to escape.



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MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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**SECTION E.**  
**FINE ARTS.**

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**Officers for 1900.**

WILLIAM H. HUSE, *President.*  
WILLIS B. KENDALL, *Treasurer.*  
WILLIAM E. BUCK, *Auditor.*  
EVA F. TUSON, *Clerk.*

**DIRECTORS.**

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| HENRY W. HERRICK,  | WILLIAM E. BUCK,     |
| NORWIN S. BEAN,    | J. BRODIE SMITH,     |
| W. R. CALL,        | WILLIAM K. ROBBINS,  |
| LUTHER C. BALDWIN, | CHARLES H. BARTLETT. |

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## SECTION E.

# FINE ARTS.

### REPORTS OF MEETINGS.

During the winter Mr. William E. Burbank and Mr. J. Warren Thyng continued their art classes that were begun in the fall of 1899. Mr. Burbank met his class on each Thursday evening and directed their work in drawing from the antique; Mr. Thyng, his class on Friday evenings, and lectured to them on perspective and the art of composition. Both classes were well attended, and to both gentlemen the Institute owes much for their interest in and efforts for the success of the organization. Both classes were discontinued in the early summer.

In the fall Mr. Burbank resumed his instruction on Thursday evenings; Mrs. Maud Briggs Knowlton began instruction to a class in wash drawing from still life, on Saturday evenings, and Mrs. Melusina H. Varick organized a class in wood carving to meet on Friday evenings. So many applied for admission to Mrs. Varick's class that a second class was formed for work on Saturday mornings. Through these classes the Section has been doing more practical work than for years before it united with the Institute.

On November 20, Rev. Charles J. Staples began a course of lectures on "Studies in Literature," under the auspices of this Section. His subject on that date was "Elements of the Best Literature," His dates and subjects for the remainder of the course were: December 18, 1900, Charlotte Bronte; January 15, 1901, William M. Thackeray; February 11, 1901, William Wordsworth; March 12, 1901, Robert Browning.

At the annual meeting of the Section, held at the rooms of

the Institute, October 9, 1900, the following officers were elected for the ensuing year :

*President*—William H. Huse.

*Treasurer*—Willis B. Kendall.

*Auditor*—William F. Buck.

*Clerk*—Eva F. Tuson.

*Directors*—Henry W. Herrick, Norwin S. Bean, W. R. Call, William F. Buck, J. Brodie Smith, William K. Robbins, William F. Burbank, Mrs. John B. Varick.

# **WILLIAM MAKEPEACE THACKERAY**

BY REV. CHAS. J. STAPLES.

A LECTURE DELIVERED BEFORE SECTION E. OF THE  
MANCHESTER INSTITUTE OF ARTS AND SCIENCES

JANUARY 15, 1901.

A well-worn subject is not, therefore, uninteresting. The fact that it is well worn and has been treated many times by many men of many minds only goes to prove its fascination. This writing about writing is rather poor business; and yet if we can forget what has been written about Thackeray and look at his work with our own eyes we may gain a fresh point of view that may not be without its value. It may set others to looking, too; it may bring out some unexpected lines and features. But yet our criticism will be false and futile if it represent but a personal whim, the vagary of one who strives to see something no one ever saw before. Mere personal taste counts little; we must justify our ways, at least to ourselves. What shall be our standard of what is best in literature when we think of work like Thackeray's, wide-reaching, large in amount, intensely individual? Without trying to settle such a tremendous question let us dodge it with what the scientists call a "working hypothesis." Suppose we say that all literature possesses the qualities of substance and the qualities of form. One is the thought, the other the expression; one concerns the mind and feeling put into any work, the other the way and manner in which the subject is treated, its art and language. In the best literature we find a certain quality of its substance we may call zest, earnestness, or power; the presence of a compelling

force which moves the man to speak because he must, because he has something to say. Another of these substantial qualities is breadth or range. Another is wholesomeness; in the best literature must be nothing morbid and unhealthy. Some of the qualities of form are its unity or directness, its imaginative power, and the ease or smoothness of the style. Let us look at our poor victim of an author, then, along these lines.

In the eyes of his contemporaries I suppose Thackeray seemed to be daringly unconventional. The spirit of rebellion against the usual style of the far-fetched and romantic novels common at that time showed itself in Thackeray's keen and quiet satire, in his desire to exhibit men and women as they are, even if it should be necessary to write a story without a hero. For the hero was an indispensable requisite to every well-regulated novel before Thackeray's day. Some being of transcendent excellence, man or woman, must dominate the story; at his or her appearance every knee must bow, the choicest adjectives were scattered with unsparing hand, the most unusual adventures must be devised to show off hero and heroine, their woes must be heaped mountain high, their invention and daring, their passion and pain, their valor and foresight must be superhuman, else the tale was voted by novel readers of the forties and fifties tame and insipid. Here, for example, is a short passage from Miss Jane Porter's "Scottish Chiefs," an exceedingly popular book in its time and written about 1809.

"The shriek of horror that burst from every mouth interrupted Wallace. "Vengeance! Vengeance!" was the cry of the men, while tumultuous lamentations for the "sweet Lady of Eilerslie" filled the air from the women.

Wallace sprang from the cliff into the midst of his brave countrymen: "Follow me, then, to strike the mortal blow!" \*

"Death and Lady Marion!" was echoed with shouts from mouth to mouth. Every sword was drawn; and those hardy peasants who owned none, seizing the implements of pasturage, armed themselves with wolf-spears, pickaxes, forks and scythes.

Sixty resolute men now arranged themselves around their chief. Wallace, whose widowed heart turned icy cold at the

dreadful slogan of his Marion's name, more fiercely grasped his sword, and murmured to himself, "From this hour may Scotland date her liberty, or Wallace return no more. \* \* \* Before the moon sets, the tyrant of Lanark must fall in blood."

"Death and Lady Marion!" was the pealing answer that echoed from the hills.

Wallace again sprang on the cliff. His brave peasants followed him; and taking their rapid march by a near cut through a hitherto unexplored defile of the Cartlane craigs leaping chasms and climbing perpendicular rocks, they suffered no object to impede their steps while rushing onward like lions on their prey."

A reaction from this stilted and unnatural apotheosis of human perfection could but follow. The long bow of exaggeration was strained to breaking. Such writing began to seem hollow and false. Dickens, with all his grotesqueness, was among the first to return to common folks, and Charlotte Bronte and Mrs. Gaskell wrote out of real experiences and trials and told of real people. But Thackeray was to deal the hardest blow upon this habit of affectation and pretence in fiction, and we shall fail to do him justice or to understand his writing without bearing that in mind first of all. He set out to puncture shams, to reveal the essential wrong and wickedness of pretence in all its myriad personal and social forms. He was at heart a truth-lover, a hater of meanness and folly, and withal the gentlest, kindest knight that ever laid lance in rest to win a joust against falseness and hypocrisy. That was the work given him to do, and he accomplished it with such exquisite delicacy, his tools were kept so sharp and bright, his skill was so perfect in its way that one is irresistably reminded of that mediæval legend about the executioner, so marvellously deft at his trade, that, having operated with noiseless and invisible swiftness, his poor victims knew not they were beheaded until, gracefully offering his snuff-box, the force of the pleasant and inevitable squeeze sent their heads rolling upon the pavement. But Thackeray never touched the springs of deepest passion or revealed the inner suffering and inner delight of souls. As a writer he held himself curiously aloof from his own creations. Sometimes it is even provoking. "Why doesn't the man show a little fire, a little enthusiasm?" we ask. "Why doesn't he hurrah a little

or groan a little? Why does'nt he get into the heart of these folks and ruffle his feathers a bit?" No, he never does. He is ever calm. He is occupied with the outward show of life, with its pomp and pageantry, with its appearances, even in dealing with humble circumstances, and he is marvelously faithful to all the superficial details. His stories are the most vivid of panoramas; these figures live and will live, this crowded scene is fascinating, the finest illusion you or I need ever expect to witness. It is a picture of rare energy and power, delicately and finely wrought—and yet it is painted canvas, it is the surface of things and you must not approach too closely or inquire too shrewdly; the depth, the depth of life is not there, or but rarely. And none knew this better than Wm. M. Thackeray himself:

"The play is done; the curtain drops,  
Slow falling to the prompter's bell;  
A moment yet the actor stops,  
And looks around to say farewell.  
It is an irksome word and task  
And, when he's laughed and had his say,  
He shows, as he removes the mask,  
A face that's anything but gay."

And thus we already touch, do you not see, that deep and primal test of the substance of the best literature. "Has it the power of earnestness? Does it show zest and joy and a living energy, making men feel it is a great thing to be alive?" I am afraid that is not true of Thackeray, and it irks me to say it. I have been twisting things in the attempt to reconcile my heart and my conscience; my heart that loves Thackeray, the man, and loves his books too, finding in them a perpetual delight—and my conscience that sees and feels more and more clearly that the man did not write because he had something of fire within, but because it was a thing he could do and do it well, partly because it was agreeable and interesting to pour out the full treasure of his observation and his thought. I have even been tempted to fit a brand-new theory to the case, just to accommodate one who never had anything but the kindest intentions and the most heart-winning boyishness of spirit in the presence of the whole human race. But on the whole I must sorrowfully stick to my standards. Somehow the great heart of

the man did not get into his stories except by implication. He was too shy, too reticent, perhaps felt too genuinely and deeply to ever unburden himself and make talk about the real things of life. Yes, I think that is true. He had the man's shyness that leaves the deepest and best things unsaid, a sensitive spirit that concealed itself behind all outward acts, knowing keenly what careless, painful and irritating comments are made by the world on what the soul holds most dear. For the real life and vital touch in Thackeray you must go to his letters, to the anecdotes about him, to his comical sketches; to his ballads and verses. It was here he bubbled over in fun, let himself loose, played the generous, hearty boy he actually was. That he couldn't do with the general public. He never quite forgets in his novels that somebody is looking on.

How far away this is from Homer or Shakespeare! *There* are two personalities that stand forever as types of that substantial quality, that primitive force in literature which shows men that take their work seriously because they are in it heart and soul. Homer, (yes, I know it has been doubted there ever was a single individual of that name, but the name represents a stage at any rate in Greek thought and Greek history) Homer plunges into his tale with the hearty unquestioning delight and unconsciousness of boyhood. He is excited by the swish of the water as the boat cuts the Ægean or he follows the precise steps of a priestly sacrifice with the serene assurance that everyone is equally interested with himself. He didn't see anything sad in life. It was all prime fun. But Thackeray is the boy without the unconsciousness of boyhood. The trail of the blase is over his work. "Let us make the best of it," he would say, "but there's not much to be proud of in this world. It is empty, it won't bear examination, it is a puppet show." Imagine Shakespeare giving that impression; you can't imagine it. Withal he gives you far crueller tragedies and shrinks not from the agonies, physical, mental and moral, the sum total is always the profound and lasting conviction that this is a great world with vast undiscovered realms in it of unmeasured potencies and excellence. One Cordelia, Portia and the rest, redeem the presence

of all the Gonerils and Shylocks. Even Hamlet and Othello and Lear by their capacity for thought and love and suffering prove the nature of man writ large.

But Thackeray belongs in his intellect to a different order. He must be ranked with Franklin, though with a far finer imagination of course. He wrote like the apostle of common sense, with shrewdness, wide and tenacious observation, not too much credulity, with piercing insight, with courteous kindness and large toleration. Or better, he was like the writer of Ecclesiastes whose "Vanity of vanities all is vanity," he echoes at the end of his book :

"Ah! Vanitas Vanitatum! which of us is happy in this world? Which of us has our desire? Or having it, is satisfied? Come, Children, let us shut up the box and the puppets, for our play is played out."

He is like the French writers of the 18th century whom personally he did not like, because of his clearness of vision, his tendency to exhaust himself on the surface of life and his refusal to touch what lies below. Thackeray's stories always run leisurely. They seem to say, "Why so hot, friends, the world will wag on much the same no matter what happens to these men and women of mine. This boy Pendennis whom you see making such fervid blind love to the beautiful Fotheringay will soon come out of his dream. His passion is real enough, poor fellow, but see how blind it is. This little Amelia, what a pretty trusting doll it is. She will devote the fidelity of years to a self-made idol and Becky carries the while the letter which proves him mean as mud, among her secret treasures. Dear Col. Newcome will be caught in the trap of his own honesty and want of suspicion; we must not be over-hasty to conclude that he will have the good which he deserves. He is the victim of a combination which was beyond his power to change. We are puppets."

"And in the world, as in the school,  
I'd say how fate may change and shift;  
The prize be sometimes with the fool,  
The race not always to the swift;  
The strong may yield, the good may fall,  
The great man be a vulgar clown,  
The knave be lifted over all,  
The kind cast pitilessly down."

Now on the outside of this world, fate is all powerful; but in

the substance of the best literature, you are made somehow to understand that there is that which is mightier than fate, and man is master of it.

So it is pleasanter to turn to our second test. What is the range of Thackeray's work? Certainly it is very great and deserves the highest praise. I think very few of the novelists, unless it be Dickens and Hugo have equalled or surpassed him.

Thackeray knew his world well. It was a city world and a masculine world, an upper and middle class world, these are its limitations. We may take these limitations first. He knew the country mostly as it is seen from within English country houses. There is a marked absence of landscape in his writing. His people never make remarks about the landscape, nor does he. They seem chiefly anxious to get back to the city, or at least within doors.

Perhaps this passage from Chapter XXIII of *Vanity Fair* will illustrate this point. Major Dobbin, you are to remember, has just landed from his last long service in India. He has heard nothing from Amelia but idle gossip. He comes on shore at Southampton. The description you will find capitally done but how brief it is, and in what general terms. Like his hero, he hurries to London.

"The chaise came up presently, and the Major would wait no longer. If he had been an English nobleman on a pleasure tour, or a newspaper courier bearing despatches (government messages are generally carried much more quietly), he could not have travelled more quickly. The post-boys wondered at the fees he flung among them. How happy and green the country looked as the chaise whirled rapidly from milestone to milestone through neat country towns where landlords came out to welcome him with smiles and bows; by pretty roadside inns, where the signs hung on the elms, and horses and wagoners were drinking under the checkered shadows of the trees; by old halls and parks rustic hamlets clustered round ancient gray churches — and through the charming English landscape. Is there any in the world like it? To a traveller returning home it looks so kind — it seems to shake hands with you as you pass through it. Well, Major Dobbin passed through all this from Southampton to London, and without noting much beyond the milestones along the road. You see he was so eager to see his parents at Camberwell."

Thackeray held not the very modern idea that character is found by the scenery it keeps. He would have been free to label such an idea another humbug. Still, this great novelist did miss the value and significance of life out-doors; he had no eye for the frame and setting which nature furnishes to man. He did not care much for the virtue of the poor, and rather disbelieved in it. He wasn't brought up in that atmosphere. Poverty irritates him. He draws a freer breath when away from it. And then, as Charlotte Bronte never could draw a satisfactory man, Thackeray certainly did not succeed with his women. It is one of the perplexities about him. "Why are all your women either knaves or fools," suddenly demanded a lady in conversation with him, and we may well believe that his reply was only a rebuke to the inquisitor, "Because, madam, I know no others." The fact remains, and it is better to think that it was due to the surroundings and history of his own life, due to misfortune and ignorance rather than to any other cause, He did not create the

"Perfect woman, nobly planned  
To warn, to comfort and command."

He did, it is true, conceive a real live woman in Becky Sharp, one of the few great characters in fiction. Whatever her faults as a possible woman, she is actual flesh and blood in that Vanity Fair which never ceases among men. But I wonder if you feel with me at times that Becky Sharp is a little "overdone"? Don't you think the author makes her out too uniformly wicked, too unbrokenly sly and selfish? I don't believe the real Becky was without some moments of sanity, that she did care for something beside herself. I don't believe that anyone could live without that. But at any rate Thackeray doesn't leave her alone enough. He seems to be afraid we shall find something commendable in the little orphan. He pours out his sarcasms upon her. He is ever pointing the finger at her. On the last page of the novel he points the finger from away, way off, as if she was almost out of sight in the depths of degradation. He brings her near to the attainment of her schemes time and time again, only to see the careful card castle topple at a breath. He is almost vicious with her; her presence excites him as if he were a

house dog growling out of an unreasonable antipathy towards one of the neighbors. He won't let us have an atom of sympathy with the designing creature until—well, it may be very immoral for a minister to confess it, but he really creates in the virtuous breast a reactionary delight in the keen-witted scamp and a fervent though wicked wish that she might succeed in her cleverness. As for Thackeray's good women they are simply exasperating, Mrs. Pendennis and Laura, Henry Esmond's gracious lady, Amelia Sedley. Even Ethel Newcome is not much better, hardly more than a shadow, and Beatrix Esmond, who does not pretend to be exactly good, we may count the most successful of the assembly.

And yet with all these abatements it is a large and varied world he sets forth in his pages; it is the picture gallery of a wide-eyed traveler. He has seen many lands and many faces, like the much-enduring Ulysses. None have disclosed as he the life of the average modern man in certain social grades. Major Pendennis is enough to make one novelist's reputation. He knows well the men of the press and the ball-room, the camp and the court. He seems to hover on the verge of the grotesque and the caricature all the time, and yet makes you appreciate the undeniable truth of his lives and sketches. The life of the school and the college not even Kipling has given with such fidelity, and "Grey-friars" is classic ground to all English readers since the Charter-house disappeared. The life of the valet, of the returned East Indians, of British travelers abroad, of the petty German counts, the wild Bohemianism and *cameraderie* of the London inns of court and the coffee-houses down to the inimitable "Back Kitchen" of Pendennis, all is gathered up with a masterly hand. And then that wonderful power of realizing a past age in Henry Esmond, the most finished and complete work of the sort ever accomplished! I cannot praise highly enough its vivid presentation of the very atmosphere of Queen Anne's London and the very thoughts and feelings of the world as it went then. So great is this range of insight into many varieties of human nature that in the future men will go to Thackeray as the true historian of the middle 19th century in England. I

think, as I said before, he entirely misses the deep realities of that life, its undercurrents, but so far as the external appearance goes this was the half-world of the Victorian age.

That it is, after all, only a half-world Thackeray gives us in his novels is the severest criticism that can be passed upon the wholesomeness of his influence. We are compelled to admit that he fits better into the middle-age point of view. Hearty and unsophisticated youth is not apt to admire him. His view of the human lives about him is too monotonously depressing and sad, and youth does not yet feel the charm of his virile intelligence. I remember that it was years before I could get interested in *Vanity Fair*, though I made repeated trials, while *Esmond* was one of my first loves and my last. *Vanity Fair* is not a work to be put in any one's hand who is not ready for it. Mature life finds itself in large measure reflected there, but generous youth not at all. The greatest men in literature have and must be men of faith, not in a narrow and theologic sense, but in the sense of looking forward, of noble expectation. Life cannot be lived at its best without that, and to lose noble expectation—some love of liberty, or service, or ideal character—is the greatest possible loss. The illusions of vigorous souls are nothing to be ashamed of or scorned. As they "fade into the light of common day" they ought to strike deeper root in reason and right. Thackeray has not the wholesomeness of a large faith. But, having said this, there is a good deal on the other side. I do not think he seriously harms any one who has not already harmed himself. Many have hid their own weakness, cynicism and failure behind the name of one whose heart, I believe, was sound. It is the first plunge into Thackeray that hurts, it is the wholesome hurt of knowing some things as they are. Truths and half-truths are apt to hurt and they may be good for a man to know. It is good for a man to know the meanness of cant, hypocrisy and pretence in all its myriad forms. And so a robust nature rises from Thackeray not harmed but purified. He *has* the wholesomeness of honest intelligence, the courage to look at the meaner forms of evil in the world and not be overcome by the world. So that after the first plunge you come to

see that Thackeray is by no means a hopeless soul. He is so anxious to be truthful to the appearance that he almost falls off on the other side. But not quite. For as you come to know the people of his stories better you find they never mock at any real goodness, that to their creator the luster of even commonplace kindness and generous charity shines the fairer for the weakness, folly and frailty by which it is surrounded. Beside his intellectual clearness there is in Thackeray a great tenderness of heart towards all who are in trouble and failure, all who are betrayed either by themselves or others.

“‘It is not difficult to be a country gentleman’s wife,’ Rebecca thought. “I think I could be a good woman if I had five thousand a year. I could dawdle about in the nursery, and count the apricots on the wall. I could water plants in a greenhouse, and pick off dead leaves from the geraniums. I could ask old women about their rheumatism, and order half a crown’s worth of soup for the poor. I shouldn’t miss it much out of five thousand a year. I could even drive out ten miles to dine at a neighbor’s, and dress in the fashions of the year before last. I could go to sleep and keep awake in the great family pew; or go to sleep behind the curtains, with my veil down, if I only had practice. I could pay everybody if I had but the money. That is what the conjurors here pride themselves upon doing. They look down with pity upon us miserable sinners who have none. They think themselves generous if they give our children a five pound note, and us contemptible if we are without one.’ And who knows but Rebecca was right in her speculations—and that it was only a question of money and fortune which made the difference between her and an honest woman? If you take temptations into account, who is to say that he is better than his neighbor? A comfortable career of prosperity, if it does not make people honest, at least keeps them so. An alderman coming from a turtle feast will not step out of his carriage to steal a leg of mutton; but put him to starve, and see if he will not purloin a loaf. Becky consoled herself by balancing the chances and equalizing the distribution of good and evil in the world.”

I do not rise from “The Newcomes” or from “Vanity Fair” with any bitterness, but with a larger consideration and even love towards man. It is as though the writer of a new Ecclesiastes said, “I promise you no perfect creatures among human

folks ; I find none in the world ; but I will give you character in place of perfection ; I will give you erring, weak and fallible humanity. I give you men you can never think of afterward without a glow around the heart, lank and faithful Major Dobbin, bearing the burdens of a host of others, Colonel Newcome, with his childlike honor and purity of soul, Esmond, a soldier of coolness, patience and magnanimity." He saw through them all. And still we love them the more, just as we do our own folks. If his is not the clarion note of faith, he has in noblest, fullest form the heart song of charity. "And the greatest of these"—it was said long ago.

When we pass from the qualities of substance to the qualities of form we simply acknowledge in Thackeray the master of our English speech. His is the well-nigh perfect power of expression in language, so that you are hardly conscious, without examination and study, how fine his skill. We forget he has a style in the mere pleasure of listening. In a far wider and truer sense than of Goldsmith it might be said, "He touched nothing he did not adorn." It seems to make little difference what his immediate subject may be, even though in itself rough and repellent, you want to have him keep on talking, and the end of the chapter always comes too soon. For with him the words are never in the way. They have the precision and deftness of a perfect machine. You like to watch the machine's smooth, swift motion whether the machine is producing anything or not. Thackeray is discursive, following one pleasant path after another, while his characters wait in awkward situations ; but you do not care so long as your ears are beguiled with that pleasant and charming music. He makes long and sometimes exasperating comments on his characters, minutely describing the mechanism of his puppet show, where you would much prefer to have them speak for themselves. "Why can't he let them be!" But never mind. The talk is so beautiful in itself, the sentences flow with such simplicity and naturalness, the terms are so fit, so full of meaning, without a particle of exaggeration, that you want him to go on commenting forever. He scolds ; but was there ever such admirable scolding ? That is the trouble with

his scolding and his satire ; it is so smooth it does not sting. Thus it is that we come to Thackeray as to a master, our critical rules all forsworn and laid aside. He dictates to us, not we to him, and for education in the art of saying things we must simply read and listen till the power of it permeates the mind. It is not so rich or so sublime a style as that possessed by two other masters of English in the Victorian age, Ruskin and Martineau, but in practical usefulness and reserve, in efficiency and good sense, it surpasses them. It never runs away with him. The engineer, you are sure, is ever sitting serene, smiling and cheerful in the place of command, master of his instrument.

See how compact and terse his way and manner is ! Not a word wasted, each in its place, like well-trained servitors. You need not sift a mass of verbiage for a faint idea ; the selection has been made for you ; each sentence drives directly to its mark ; it is luminous, almost self-luminous ; there can be no mistake as to what is meant. Every paragraph is compact and finished, its subject is treated firmly and then dropped. Here is none of that oscillation, beating back and forth with hesitating step, fearful lest we have not said enough to make our meaning clear, which marks the work of those who are not sure of themselves. Here you may study the art of compression at its best, whole chapters in a verb or adjective ; telling epithets without the slightest attempt at display, no redundant descriptions or fine writing for its own sake. Nor is the effect of this unity of style jerky or abrupt. All is calm and well controlled. No evidence of haste appears. Words enough are used to keep the reader's patience from suffering jolt or hurt. In short, the language is transparent, a vehicle to convey and not conceal thought. Thackeray invites you to a journey not too hurried, and, as the advertisements say, everything will be done that is possible to promote the comfort and convenience of the traveller. The attention of the tourist will be economized to the last degree. He will not even (and perhaps this has its disadvantages, as we should see in turning to Browning) he will not even be called on to do over-much thinking for himself. The imag-

ination in Thackeray's work is of a very high though quiet order. It consists in a fine felicity of phrase, in witty and unexpected turns, in capital comparisons. This imaginative excellence extends to his conception of character. A novelist's imagination must chiefly be shown in the completeness with which he puts himself in the place of his created creatures. And Thackeray does this with almost entire success. Take Henry Esmond. There are things we do not like in Henry Esmond. The whole relation between the hero and Lady Castlewood is strained. Beatrix is exasperating, indeed, was meant to be. The denouement, though powerful and thrilling, is touched a bit with theatrical tinsel. But on the whole what an amazing success! What play of light and shade upon Esmond's fortunes! How straight and manly he stands, what an air, what a figure! You cannot escape him. He will accompany you henceforth through life. He is more vivid than many an historic character. You will always associate him with the men of Queen Anne's time and the Old Pretender. The same is true of Pendennis, or of Colonel Newcome and Clive, or of the Osborne family in *Vanity Fair*. These are not extraordinary people or very great people. But you know them better than thousands of the great are known. You live in touch with their lives, you see them, not as they think themselves or as they are, but as their nearest saw them. You see them in the whole circle of their social and family and business relations.

The best artist is least conscious of his art, and Thackeray was an artist in literature. He could not have told you how he did it, though he did not spare toil or pains when once roused to his work. We cannot enter further into the secret than to say it was his nature, a gift born with him, almost as much in evidence in his first work as his last. He did not create a style; it was the free expression of himself. It is not an artificial, manufactured style, but one that commands the ease and reserve strength of original genius. For generations to come, his fictions will be read of English-speaking men, and his place is secure. He will hold that place by virtue of the pleasure he confers upon the mind and judgment of educated men and

women. But his audience will never be a large one. He is infected with the ennui, the restlessness, the doubt, the hesitancy of modern thought. He had no strong confidence in himself or in the world of men. That is his weakness, as it is often the weakness of the artistic temperament. But yet it was much, very much, that in the turmoil and confusion of modern cities and societies he could proclaim the old, old gospel of manhood:—

"Who misses or who wins the prize,  
Go, lose or conquer as you can.  
But, if you fail or if you rise,  
Be each, pray God, a gentleman."



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MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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**SECTION F.**

**MINERALOGY AND GEOLOGY.**

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**Officers for 1900.**

GEORGE E. WINCH, *President.*  
SUSY C. FOGG, *Vice President.*  
BLANCE E. HICKEN, *Secretary.*  
SARA HUNT, *Treasurer.*

**EXECUTIVE COMMITTEE.**

GEORGE I. HOPKINS.

WILLIAM E. MOORE.

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## SECTION F.

# MINERALOGY AND GEOLOGY.

### REPORTS OF MEETINGS.

Wednesday evening, January 17, 1900. The President in the chair. After business, the regular work in the determination of minerals was done by the members under the direction of Mr. George I. Hopkins. Stibnite, Antimony, Prochlorite, and Natrolite were analyzed.

Tuesday evening, January 23. The Vice President in the chair. Mr. Hopkins gave a short talk on the cleavage of minerals, after which the analysis of a specimen given out at the previous meeting was read by one of the class. After this report on Celestite, the class studied and analyzed Apatite.

Tuesday evening, February 6. The President in the chair. After the business, Mr. Hopkins took charge of the work. The analyses of Siderite and Sphalerite were read. Calcite and Talc were studied in the class.

Wednesday evening, February 14. The Vice President in the chair. After business, Mr. Hopkins called for the analysis of minerals given out for home study: Dolorite and Pyrrhotite. Gypsum was then studied.

Wednesday evening, March 14. The analysis of Corundum, Chalcocite and Chalcopyrite were read, after which the class studied Magnetite and Orthoclase.

Wednesday evening, April 11. Mr. Hopkins addressed the class on the spring field work. The report on Garnet was read. Staurolite was studied.

Wednesday evening, April 25. Vice President in the chair.

The analyses of Hematite and Prehnite were read. A short talk on chemical formulas was then given by Mr. Hopkins.

Wednesday evening, May 9. Vice President in the chair. After business, the analyses of Cyanite and Obsidian were read. Mr. William E. Moore read a very interesting paper on "Some Phases of Geology."

Wednesday evening, May 23. President in the chair. After business, the analyses of Chalcedony and Hornblende were read.

Wednesday evening, June 6. The Vice President in the chair. The field trip to "The Pulpit" was discussed. Mr. J. A. Prescott and Mr. F. W. McKinley presented specimens of copper ore to the Section. The analyses of Pyroxene and Spodumene were read.

An interesting paper, "Glacial Action in the Vicinity of Manchester," was then read by Mr. E. P. Richardson. Mr. W. H. Huse then showed the Section some lantern slides, to give the members an idea of what they might see on the proposed Londonderry and Auburn trip.

Wednesday evening, June 21. The Vice President in the chair. After regular business, the attention of the Section was called to Miss Eugenia Lord's gift of pamphlets, "The Genesis of the Merrimack Valley," and "Atmospheric Phenomena." This was followed by the sad announcement of Mr. Lyman W. Colby's sudden death.

Wednesday evening, October 10. Owing to the small number present the meeting was informal.

Wednesday evening, October 24. The President in the chair. After business a general discussion of a plan of work for the coming season followed. The Section authorized Mr. Hopkins to carry the work on as he thought most profitable.

Tuesday evening, November 6. The Vice President in the chair. After business Mr. Burnham addressed the Section.

Wednesday evening, November 21. Informal meeting. Reports on minerals were given. The specimens analyzed were Cinnabar and Apatite. Aragonite was then studied.

Wednesday evening, December 5. The President in the chair. Notice of annual meeting given. The analyses of Wollastonite and Turgite were read, Wavellite was the new mineral studied.

Wednesday evening, December 19. Annual meeting of Section F. In the absence of both President and Vice President, the meeting was called to order by the Secretary. The election of officers was taken up and the following elected :

*President*—Susy C. Fogg.

*Vice President*—Walter S. Abbott.

*Secretary*—Grace A. Phillips.

*Treasurer*—Sara Hunt.

*Executive Committee*—William H. Huse, E. P. Richardson, Mrs. Fred L. Allen.

The analyses of Pectolite and Serpentine were read. Lepidolite was studied.



## CHANDLER LECTURE COURSE.

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Through the continued generosity of Hon. George Byron Chandler the following course of lectures has been tendered to the members of the Institute for the season of 1900-1901.

Monday, October 8, 1900. The work of the "Roycrofters," by ELBERT HUBBARD, Editor of the "Philistine."

Wednesday, November 7, 1900. Weighing the Earth, by President T. C. MENDENHALL, of the Worcester Polytechnic Institute.

Friday, December 14, 1900. Our National Music (Illustrated), by Prof. LOUIS C. ELSON, of the New England Conservatory of Music.

Wednesday, January 2, 1901. An Entomological Hour, by L. O. Howard, U. S. Government Entomologist.

Wednesday, February 6, 1901. Art in Nature Study—The Harvest of Song (Illustrated), by Prof. Henry T. Bailey, Instructor in Art in the Schools of Massachusetts.

Wednesday, March 6, 1901. A More Beautiful Civic Life, by Mrs. Lucia Ames Mead of Boston.

## SUMMER SCHOOL.

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In the winter of 1900 the idea was conceived of a department for regular and systematic out-door work by more members than would perhaps otherwise take it up. This plan was put into practical shape and a department added to the Institute, which was called, for want of a more appropriate name, a summer school. Most of its work, however, was done in the spring. The plan and scope of its work cannot be given better than in the words of the prospectus, issued before the beginning of the class work :

" A recent writer has well said that to know the lower forms of animal life is to have a better knowledge of ourselves. The thought is almost equally applicable to plant life ; for the laws of development are essentially the same in all things that live and grow. Indeed, the thought may be farther extended ; since it is probable that if we understood the laws by which the molecules of a mineral are selected, combined, and acted upon, we should hold the key to many of the mysteries of our own organisms.

" It is obviously desirable, therefore, that knowledge of nature and her laws should be universal. Unfortunately, profound research is practicable only for a limited number—those having wealth and leisure, as well as ability and taste. For advanced workers there must be large libraries, extensive museums, technical training, and costly apparatus. But while these toil in study and laboratory, the great book of nature lies open to all ; and here, about Manchester, we are singularly fortunate. Nature has spread out two volumes for us ; the Canadian and Alleghanian provinces meet at our very door. The trees and flowers, the birds and insects of two continental divisions mingle here.

" While interest in nature study is rapidly increasing, even the summer school, as commonly conducted, is inaccessible to many, partly by reason of the expense, and partly by reason of the demand upon time which cannot be spared. To meet, as far as practicable, a need that is keenly felt, a summer school has been organized under the auspices of the Manchester Insti-

tute of Arts and Sciences. For the present it will comprise four departments—Entomology, Botany, Ornithology, and Mineralogy and Geology. Competent instructors will give their services, and co-operation of able assistants is already assured. There will be practical lessons in field work for each section on alternate Saturdays, supplemented by studies and lectures at the regular evening meetings at the Institute.

The only condition is membership in the Institute, which is secured by the payment of one dollar membership fee and dues at the rate of three dollars a year. All the classes of the summer school are open to any member without extra expense, as are all the meetings and lectures of the sections and of the Institute throughout the year."

The organization consisted of the following corps of teachers :

*Principal.*

WILLIAM H. HUSE.

*Instructors.*

Section B—Entomology : EDWARD J. BURNHAM.

Section C—Botany : FREDERICK W. BATCHELDER.

Section D—Ornithology : THEODORA RICHARDSON.

Section F—Mineralogy and Geology : GEORGE I. HOPKINS.

The classes began their walks on the last day of March and continued through the spring and early summer, as will be seen by the appended calendar :

MARCH 31.—9 a. m., Ornithology ; 2 p. m., Mineralogy and Geology.

APRIL 7.—9 a. m., Botany ; 2 p. m., Entomology.

APRIL 14.—9 a. m., Ornithology ; 2 p. m., Mineralogy and Geology.

APRIL 21.—9 a. m., Botany ; 2 p. m., Entomology.

APRIL 28.—9 a. m., Ornithology ; 2 p. m., Mineralogy and Geology.

MAY 5.—9 a. m., Botany ; 2 p. m., Entomology.

MAY 12.—9 a. m., Ornithology ; 2 p. m., Mineralogy and Geology.

MAY 19.—9 a. m., Botany ; 2 p. m., Entomology.

MAY 26.—9 a. m., Ornithology ; 2 p. m., Mineralogy and Geology.

JUNE 2.—9 a. m., Botany ; 2 p. m., Entomology.

JUNE 9.—9 a. m., Ornithology ; 2 p. m., Mineralogy and Geology.

JUNE 16.—9 a. m., Botany; 2 p. m., Entomology.

JUNE 23.—9 a. m., Ornithology; 2 p. m., Mineralogy and Geology.

JUNE 30.—9 a. m., Botany; 2 p. m., Entomology.

The course was carried on as planned, except when prevented by the weather. The entomological class, under the direction of Mr. Burnham, visited the places richest in insect life, and aroused much interest on the part of those who took this opportunity to learn of the habits of insects in their native haunts. Many valuable specimens were secured for the museum.

The botanical class, directed by Mr. Batchelder, made systematic studies of our native trees during the earlier walks, as the tenderer plants were not in leaf. Some of the trees of special interest which were studied were *Quercus prinoides*, which was denied us by the older botanies, but is quite abundant about Manchester; and *Q. ambigua*, which has not yet been located as a form, variety, species or hybrid. There are some very interesting specimens in this locality. Later, on some of the trips, the only station of *Calla palustris* known in Manchester was visited, also one of the few beds of *Ophioglossum vulgatum* in this vicinity.

The ornithological class, under the enthusiastic leadership of Miss Richardson, was the most largely attended class of the school. This, like the other classes, was the means of bringing many new members into the Institute. Some of the trips were taken about the suburbs of Manchester. On two dates the class went to Auburn, and on June 9 it united with the mineralogical class in a barge ride to Bedford, visiting many places of interest. During the term fifty-two species of birds were observed and studied. The largest number seen on any one excursion was twenty-six, counted on one of the Auburn trips.

The mineralogical division, under the instruction of Mr. Hopkins, made a detailed study of the mineralogical and geological formations in this vicinity. On March 31 the quarry opened a number of years ago by the Amoskeag company on Oak Hill was visited. Much good granite has been taken from this ledge. In some blocks of gneiss taken from the surface were seen fine

specimens of contorted strata. The second walk over Wilson Hill took the class to several ledges. In one place a large piece of trap enclosing hornblende crystals, was secured for the museum. At the City farm quarry good specimens of iron pyrites and smoky quartz with crystals of feldspar were obtained. On April 28 two ledges on North Union Street were inspected. In one was an interesting dyke of trap, which in weathering seemed to disintegrate in little nodules, instead of the angular shapes that are so common. In the other ledge biotite and muscovite were found in juxtaposition. South Manchester was next visited with its several outcroppings of granite and gneiss intersected in places by trap dykes. In one place a deposit of magnetite, considerable for Manchester, was discovered and much of it secured. In another place a small crystal of apatite was found. The fifth walk was more geological than mineralogical in its character. Rock Rimmon was visited, and from the top of this high outcropping ledge the many signs of glacial action of ice and water that are so abundant here were studied at leisure.

The last excursion was a barge ride together with the ornithological class. The combined classes numbered forty. Going over through Bedford, the first stop was made near the Center, where a cut had been made through a ledge for the new Manchester and Milford railroad. Several interesting dykes of trap were shown in the walls of granite. From this place the party proceeded to the northeast corner of Amherst, near the village known locally as Joppa. Here is a small deposit of carbonate of lime, with smaller accumulations of vesuvianite and garnet. The next stopping place was the "Pulpit," a somewhat remarkable gorge that was eroded during the glacial period, probably by water falling through a moulin in the ice-sheet and flowing away below. On the return to Manchester a stop was made at the Barr farm, where specimens of bog iron ore were obtained, also some ochre that is found with the limonite.

The inauguration of a summer school so early in the season and in the way in which this was conducted was something new and in the nature of an experiment, but its results have amply

justified its conception. New members were brought into the Institute, the interest of many was aroused, and systematic work was done in the study of nature at home. The summer school was a success.

## DONATIONS.

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The following comprises the donations to the Institute during the year 1900.

### BIRDS.

*Nyctala acadia* (Acadian Owl) ; Mrs. Jennie Hackett Farnham.  
*Botaurus lentiginosus* (American Bittern, young); *Buteo latissimus* (Broad-winged Hawk); *Syrnium nebulosum* (Barred Owl); *Zonotrichia albicollis* (White-throated Sparrow, immature); William H. Huse.  
*Accipiter atricapillus* (Goshawk, unmounted); George Hosser.

### ANIMALS.

*Lepus nuttalli mallurus* (Rabbitt); *Condylura cristata* (Star-nosed mole); *Putorius noveboracensis* (Weasel, 2); *Calomys americanus* (Mouse) ; W. H. Thompson, Pembroke, N. H.  
*Lutra canadensis* (Otter); Mrs. L. B. Clough.  
Skull and spinal column of *Felis domestica* (common cat); E. J. Burnham.  
*Cynomys ludovicianus* (Prairie Dog); George I. Hopkins.

### INSECTS.

Collection of *Lepidoptera* embracing 12 *Sphingidæ*, 7 other moths and 21 *Rhopalocera* ; Frank E. Heald.  
*Basilarchia arthemis*, *Basilarchia astyanax* ; Miss Julia McDonough, Suncook, N. H.  
Collection of insects ; Harrie M. Young.

### MINERALS.

Specimens ; Albert L. Clough.  
Collection of minerals ; John R. Bruce.  
Collection of minerals ; Wallace G. Stone.  
Crystals of feldspar and quartz from Ossipee ; Specimens of pseudomorphs of quartz after calcite ; Bela H. Emerson, Hooksett, N. H.  
Sponge Coral from the Indian Ocean ; Miss Louise E. Newell.  
Collection of clay stones ; A. C. Osgood.

*Heliastrea heliopora* (Brain Coral), a specimen formerly owned by the late Captain C. W. Strain, Co. C, 10th N. H. Volunteers, presented as a memorial gift to the Manchester Institute of Arts and Sciences, by his sister, Mrs. Mary S. Richards.

### BIOLOGY.

Three tailed gold-fish ; Harrie M. Young.  
 Backbone of fish, illustrating notochord ; Dr. Lillian G. Bullock.  
 Jar containing four specimens of *Squalus acanthias* (Dog Fish) removed from the parent fish ; William H. Huse.  
*Phrynosoma cornutum* (Horned Toad) ; Henry B. Fairbanks.

### NESTS.

*Cyanocitta cristata* (Blue Jay) ; *Contopus virens* (Wood Pewee) ; Mrs. John B. Varick.

### ART.

Framed picture of General John Stark ; Clarence M. Edgerly.  
 Medallion of James Russell Lowell ; William H. Huse.  
 Framed portraits of Spencer, Tyndall, Darwin and Huxley ; Oliver E. Branch.  
 Framed copy of Emancipation Proclamation, forming allegorical portrait of Abraham Lincoln ; Mrs. Elizabeth M. Coaker.

### BOOKS AND PAMPHLETS.

Bookcase and books of the Derryfield Social Library as follows:  
 Notes on the Parables, Hosea Ballou, 1812 ; Explicatory Catechism, 1805 ; Five Points of Christian Faith, 1793 ; Burns' Justice of the Peace, 1773 ; Robinson's Proofs, 1798 ; A View of Religions ; Federal Accountant, 1827 ; Life of George Washington ; Infantry Regulations, 1817 ; Library Record Book ; Lectures on Female Education, 1794 ; Mariner's Compass, 1763 ; Letters from England, 1808 ; Christian's Life, 1795 ; Flowers of Modern Travel, 1797 ; Rollins' Ancient History, 1803 ; Thoughts on Divine Goodness, 1794 ; Watts, on the Mind, 1793 ; Spectator, 6 vols. ; History of Vermont, 1794 ; Infernal Conference, 1795 ; Blair's Lectures, 1814 ; N. H. Gazetteer, 1817 ; Gospel News, 1794 ; Laws of N. H., 1789 ; Heaven's Glory and Hell's Terrors, 1770 ; Hymn Book, 1796 ; William H. Huse.

Geographical Grammar. 1778 ; General History, Tytler, 1824 ; Saint's Rest, Baxter, 1805 ; History of South America, 1826 ; Volume of Essays, 1842 ; The Impending Crisis, H. R. Helper, 1860 ; Conquest of Kansas, Phillips, 1856 ; William H. Huse.  
History of New Hampshire, Vol. 3. Jeremy Belknap, 1792 ; Miss. M. Eugenia Lord.

## GOVERNMENT REPORTS.

Report of the Director of the U. S. Geological Survey ; Annual report of the Department of Interior, Geological Survey, 1899, Vol. 6, two parts ; Normal annual sunshine and snow-fall (weather bureau) ; Reports of the Commissioner of Education, Vol. 1, 1898-9 ; Instructions for Aerial Observers (weather bureau) ; Report of the Commissioner of Education, 1897-8 two volumes ; William H. Huse.  
Report of the Commissioner of Education ; Compendium of the 10th census 1880, Part. 1 ; Messages and Documents of the President, 1861-2 ; Edward C. Smith.  
U. S. Geological Survey, J. W. Powell, 1882-3-4-5, two vols. ; Walter S. Abbott.  
Annual report of the Bureau of Ethnology, 1890-91, J. W. Powell ; E. J. Burnham.  
Manual of 50th Congress ; Report of the Secretary of the Interior, 1886 ; Report on commercial relations with South America ; Myron W. Hazeltine.

## STATE REPORTS.

Report of the N. H. Forestry Commission, 1885 ; Report of N. H. State Legislature, 1889-1891 ; Report of Special Legislature, 1890 ; Report of the N. H. Commissioner of Lunacy, 1891 ; Report of N. H. State Prison, 1892-93 ; Report of N. H. State Library, 1892 ; Report of N. H. Bureau of Labor, 1893 ; Report on boundary between N. H. and Mass. ; Corporation Laws of N. H. ; Public Statutes, 1890 ; Amendments to Public Statutes ; Myron W. Hazeltine.  
Bank Commissioner's Report, 1887 ; Edward C. Smith.  
State Board of Health Reports, Vols. 12-13 ; Back numbers of N. H. College Bulletin ; Session Laws of 1868-69-71-73-74-75-76-78-83-85 ; William H. Huse.

## CITY DOCUMENTS.

Report of City Engineer, 1899; Report of City Library, 1899;  
William H. Huse.

## SCIENTIFIC AND TECHNICAL.

Hydrodynamics, Emerson; Zoology of Vertebrates, MacAllister;  
Hydraulics and Mechanics, Ewbanks; Old Red Sandstone,  
Hugh Miller; Popular Geology, Hugh Miller; Glaciers of  
the Alps, Tyndall; Insects Injurious to Vegetation, Harris,  
1852; Prehistoric Implements, W. K. Morehead; The Bird  
Stone Ceremonial, W. K. Morehead; Sculptured Anthro-  
poid Ape Heads, James Ferry; A Preliminary List of the  
Hemiptera of Colorado, C. P. Gillette and Carl F. Baker;  
Monograph on the Carabidæ, George H. Horn, M. D.; Cat-  
alogue of the Odonata of the Vicinity of Philadelphia, Philip  
P. Calvert; Boston Society of Natural History, Guides for  
Science Teaching, Vol. VII, Insecta, by Alpheus Hyatt  
and J. M. Arms; William H. Huse.  
The Genesis of the Merrimac Valley, S. D. Lord; Atmospheric  
Phenomena, S. D. Lord; Miss M. Eugenia Lord.  
Outline papers for course of lessons on Lithology and in Mine-  
ralogy; Prof. Geo. H. Barton.

## MISCELLANEOUS BOOKS.

Gleanings in Bee Culture, 1883-4-5-6-7, 5 Vols.; American Bee  
Journal, 1885-6-7, 3 vols.; N. H. Register, 1884-5-8, 3 vols.;  
The Constitutional Convention, Jameson; North American  
Review Vol. CXL-CXLI; War with Mexico Reviewed;  
History of Candia, J. Bailey Moore; City Directory 1885;  
Package of pamphlets on various subjects; William H. Huse.  
State Papers, Addresses and Poems of the late Hon. Moody Cur-  
rier; Mrs. Moody Currier.  
Transactions of the Literary and Historical Society of Quebec;  
Life of Joseph Francis Perrault, one of the founders of the  
Institution; Literary and Historical Society of Quebec.  
A Trip among the Glaciers, Hon. J. W. Patterson; Influence  
of the Netherlands on the American Republic; Prize Essay  
of American Public Health Association, Mrs. Mary H. A-  
bel; Essay on Effects of Intemperance; Address by Hon. J.  
W. Patterson at the College for the Deaf, Washington, D.  
C. 1889; Dartmouth College Catalogue 1890; Myron W.  
Hazeltine.

Record of the Lamb, Savory and Harriman families by Fred W. Lamb ; Fred W. Lamb.  
 Wilderness Ways, William J. Long ; Nature Study Press.  
 196 Books and pamphlets and 4 maps ; Frank H. Challis.  
 American Ornithology ; Bird Lore ; Bryologist ; Condor ; Cornell Nature Study Bulletins ; Fern Bulletin ; Gamophyllous ; Journal of Applied Microscopy ; Le Naturaliste Canadien ; Mineral Collector ; Meehan's Monthly ; Nature Study ; Ohio Naturalist ; Plant World ; Scientific American ; Torreya ; "*Nature Study*" Press.

## MISCELLANEOUS.

\$320.00 for "Chandler Lecture Course" ; Hon. G. Byron Chandler.  
 100.00 for permanent improvements ; Mrs. Aretas Blood.  
 25.00 for Journal of Proceedings ; Mrs. L. M. French.  
 25.00       "       "       J. Brodie Smith.  
 25.00       "       "       Norwin S. Bean.  
 25.00       "       "       Albert L. Clough.  
 5.00       "       "       Hon. Henry E. Burnham.  
 15.00 for permanent improvements ; Charles L. Richardson.  
 Electric light for rooms ; Manchester Electric Co.  
 Bill and foot of Albatross captured on board the man-of-war Macedonia during the Mexican war by an uncle of Mr. Bruce ; John R. Bruce.  
 Portions of two trees showing evidences of beavers' work ; Frank E. Heald.  
 Bow, two arrows and assegai from South Africa ; Miss Sarah E. Parker, Pembroke, N. H.  
 Date stone (1839) from Dunklee building, where Weston building now stands ; James W. Wilson.  
 Section of hard pine tree showing bullet imbedded in wood ; Harrie M. Young.  
 Indian stone implement ; Edward W. Clough.  
 Boards for wood carving class ; J. Hodge.  
 Cotton bolls ; Eben Ferren.











**BOWLDER OF PORPHYRITIC GNEISS IN  
DUNBARTON.**



**GNEISS BOWLDER ON LINE BETWEEN  
MANCHESTER AND LONDONDERRY.**

PROCEEDINGS  
OF THE  
MANCHESTER INSTITUTE  
OF  
ARTS AND SCIENCES.

VOL. III, 1901.

Manchester, N. H.



PUBLISHED BY THE INSTITUTE.

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NATURE STUDY PRESS, DEAN AVE.

1902.

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PUBLICATION COMMITTEE.  
FREDERICK W. BATCHELDER, ALBERT L. CLOUGH,  
WILLIAM H. HUSE.

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# MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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## BY - LAWS.

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### OFFICERS.

The officers of this corporation shall be a President, Vice Presidents (the number of which to be determined by provisions hereinafter made), a Treasurer, a Clerk, a Corresponding Secretary, a Curator, a Librarian, and a Council constituted as hereinafter provided, all of whom shall be elected annually and hold their offices respectively for one year and until their successors are elected and qualified.

### DUTIES.

*President.* The President shall preside at all meetings of the association, and discharge the usual duties of that office. He shall be the executive officer of the corporation and also be the presiding officer of the Council.

*Vice Presidents.* In the absence of the President a Vice President shall preside in his stead and discharge all the duties of the office, excepting that he shall not be executive officer of the corporation.

*Treasurer.* The Treasurer shall discharge all the usual duties of that office and shall give bond for the faithful performance of his duty, in such amount with sufficient sureties as shall be

determined by the Council. He shall have the custody of the seal of the corporation and shall render a report, suitably audited, of the financial condition of the association at the time of the annual meeting.

*Clerk.* The Clerk shall perform all of the usual duties pertaining to his office and such other duties as may be required from time to time by the Council, and shall be sworn to the faithful performance of his duties. He shall also be clerk of the Council.

*Corresponding Secretary.* The Corresponding Secretary shall discharge all the duties customary to his office, shall conduct correspondence with other associations and persons alike interested, shall have the care and custody of the documents, books and papers not connected with or incident to the records and papers properly belonging to the office of Clerk, and he shall perform all such other duties as the Council may require.

*Curator.* The Curator shall have the care and custody of the cabinet, art gallery and other property of the Institute, and perform such other duties as may be required by the Council.

*Librarian.* The Librarian shall have the care and custody of all books, pamphlets, maps and charts belonging to the Institute. He may appoint an assistant, for whom he shall be held responsible.

*Council.* The Council shall consist of not less than seven members, and the number required for such membership, in addition to President, Clerk, Corresponding Secretary, Treasurer, Curator, Librarian and Vice Presidents, as hereinafter provided, shall be elected annually by the corporation. The Council shall have power to appoint all necessary committees, to act on resignations of the officers of the corporation, and to fill vacancies occurring among them.

#### MEMBERSHIP.

Any association, club or organization may become a member of this corporation, with the approval of the Council, by filing with the Clerk an application stating the name and purpose of such organization, with a request to be admitted as a member, and the payment of one dollar. Such membership, when ob-

tained, shall make by the operation of this by-law, all of the members of said association, club or organization members of this corporation upon subscribing to the by-laws.

Any person may be elected to membership by the Council upon being recommended by two members, paying the Treasurer the sum of one dollar and subscribing to the by-laws. All applications for membership should designate the section or sections with which the applicant will unite.

Any person may be elected a corresponding member of the Institute by a unanimous vote of the Council, and such member shall be exempt from the payment of dues and membership fee. Any person who shall pay to the Institute the sum of one hundred dollars at any one time shall, on his request, be elected a life member, and as such shall be exempt from all further dues and assessments.

#### SECTIONS.

Any association, club or organization, admitted to membership as hereinbefore provided, may become a section, which shall be designated alphabetically by the Council, and have authority to establish its title, to maintain its autonomy and manage its affairs, not inconsistent with these by-laws.

Each section shall have a chairman who shall discharge all of the duties pertaining to such office and ex-officio be and become a Vice President of the association and a member of its Council. Such chairman shall be elected by the section at or before the time of the annual meeting of the association and his election shall be certified by the Secretary of the section to the Clerk of the corporation.

Five or more members may organize a section, with the approval of the Council.

#### BRANCHES.

Five or more persons organizing themselves as an association, or any association previously formed, the purposes of which are harmonious with those of the Institute and which consists of five or more persons, not residents of Manchester, may apply for membership in the Institute and, upon election, shall become a

branch of the same. Such branch, as a whole, shall be entitled to all privileges and subject to all rules which refer to individual members and shall, in a general way, be regarded and treated as such. It shall be incumbent upon such branch to make return to the Clerk of the Institute of the names and addresses of its members and of its officers at the time of their election, together with a report of the condition and year's work of the branch.

Any individual member of such a branch, being a non resident of Manchester, shall be entitled to the general privileges of the Institute rooms, Library and Collections, and to such other privileges as the Council may from time to time extend.

#### MEETINGS.

The annual meeting of the corporation shall be held upon the first Wednesday of January, at such hour and place as the Clerk shall deem expedient. Special meetings may be held at such time and place as the Council shall deem expedient. Notice of all meetings shall be given by publication in some newspaper in the city of Manchester by one publication at least ten days prior to said meeting or by written or printed notice by mail to the last known address of each member at least ten days prior to the meeting.

#### DUES.

The annual dues shall be three dollars, payable in advance. New members shall be charged for whole months or fraction thereof to the time of the next annual meeting. Any person who fails to pay such dues for one year shall cease to be a member, and his or her name may be stricken from the roll by vote of the Council, after notice by the Clerk of the corporation setting forth such delinquency and the provision of this by-law, and any member may be removed by the Council for cause upon charges after due notice and hearing.

#### QUORUM.

At any meeting of the corporation ten members shall constitute a quorum,

AMENDMENTS.

These by-laws may be altered or amended at any meeting of the association, notice having been given of the proposed change.



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MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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OFFICERS FOR 1901.

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ALBERT L. CLOUGH, *President*.  
EDWARD J. BURNHAM, *Corresponding Secretary*.  
NORWIN S. BEAN, *Treasurer*.  
HARRIE M. YOUNG, *Clerk*.  
WILLIAM H. HUSE, *Curator*.  
CHARLES J. ABBOTT, *Librarian*.

COUNCIL.

|                    |                           |
|--------------------|---------------------------|
| ALBERT L. CLOUGH.  | MRS. MELUSINA H. VARICK.  |
| EDWARD J. BURNHAM. | MRS. LUCIA MEAD PRIEST.   |
| NORWIN S. BEAN,    | HENRI SCHÆFFER.           |
| HARRIE M. YOUNG.   | OLIVER E. BRANCH.         |
| WILLIAM H. HUSE.   | MISS THEODORA RICHARDSON. |
| CHARLES J. ABBOTT. | MRS. S. C. BROWN.         |
| G. BYRON CHANDLER. | MRS. ANNIE V. BATCHELDER. |
| J. BRODIE SMITH.   | MISS JENNIE YOUNG.        |
| WM. K. ROBBINS.    | MISS SUSY C. FOGG.        |
| EDGAR D. CASS.     |                           |

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## ROLL OF MEMBERS.

Jan. 1, 1902.

|                            |                       |
|----------------------------|-----------------------|
| Abbott, Miss Annie F.      | 16 Walnut.            |
| Abbott, Charles J.         | 18 Manchester.        |
| Abbott, Florence L.        | 356 Laurel.           |
| Abbott, Mrs. Hattie S.     | 342 Manchester.       |
| Abbott, Miss Maude C.      | " "                   |
| Abbott, Walter S.          | " "                   |
| Adams, Charlotte R.        | 362 Hanover.          |
| Africa, Walter G.          | 39 Hanover.           |
| Aldrich, Dr. E. B.         | 83 Hanover.           |
| Aldrich, Mrs. E. B.        | 84 Ash.               |
| Allen, Miss Bertha A.      | 33 Walnut.            |
| Allen, Fred L.             | " "                   |
| Allen, Mrs. Fred L.        | " "                   |
| Ansell, William H.         | 11 Parker Avenue.     |
| Ayer, George W.            | 51 Erie.              |
| Ayer, Miss Mary L.         | " "                   |
|                            |                       |
| Bailey, Henry L.           | 308 Orange.           |
| Baldwin, E. T.             | 600 Beech.            |
| Baldwin, Mrs. E. W.        | 322 Pearl.            |
| Bancroft, Clarence         | 759 Pine.             |
| Barker, Miss Ella F.       | 998 Valley.           |
| Barnes, Miss Mary F.       | 331 Hanover.          |
| Barney, Hial               | 708 Pine.             |
| Barr, Miss Florence G.     | 17 Harrison.          |
| Barr, Miss Mary E.         | Elliot Hospital.      |
| Bartlett, Rev. A. Eugene   | 187 Ash.              |
| Bartlett, Mrs. A. Eugene   | " "                   |
| Batchelder, Frederick W.   | 220 Myrtle.           |
| Batchelder, Mrs. Annie V.  | " "                   |
| Batchelder, Miss Kate E.   | 27 Nashua.            |
| Bean, Norwin S.            | Second National Bank. |
| Bickford, Charles W.       | 480 Maple.            |
| Bickford, Mrs. Emma S.     | 15 Ash.               |
| Bisco, George              | 593 Maple.            |
| Blackstone, Mrs. Carrie S. | 639 Chestnut.         |
| Blair, Mrs. Eliza N.       | 67 Prospect.          |
| Blake, Miss Annie F.       | 609 Pine.             |
| Blood, Mrs. Lavina K.      | 154 Lowell.           |
| Bossi, Arnold L.           | 1962 Elm.             |

|                            |                             |
|----------------------------|-----------------------------|
| Bourne, Mrs. Grace M.      | 1741 Elm.                   |
| Bourne, Mrs. Harriet K.    | " "                         |
| Bourne, Henry D.           | " "                         |
| Bourne, Miss Meta          | " "                         |
| Bourne, Stephen N.         | " "                         |
| Boutwell, Mrs. Mary S.     | 587 Union.                  |
| Bradley, Rt. Rev. Denis M. | 145 Lowell.                 |
| Branch, Oliver E.          | 229 Prospect.               |
| Branch, Mrs. Sarah C.      | " "                         |
| Brickett, Miss Mabel J.    | 150 Orange.                 |
| Broderick, James A.        | 174 Bell.                   |
| Brooks, Edward M.          | 867 Elm.                    |
| Brooks, Miss Ethel C.      | 541 Maple.                  |
| Brooks, Miss Gertrude H.   | 413 Beech.                  |
| Brown, Mrs. Abby S.        | 681 Union.                  |
| Brown, George H.           | 18 Brook.                   |
| Brown, Dr. James S.        | 681 Union.                  |
| Brown, Mrs. Marie E.       | 249 Pearl.                  |
| Brown, Mary E.             | 322 Pearl.                  |
| Brown, Mrs. S. C.          | 395 Lowell.                 |
| Bryant, E. M.              | 28 Hanover.                 |
| Bullock, Dr. Lillian G.    | 295 Hanover.                |
| Burbank, William E.        | 357 Merrimack.              |
| Burnham, Edward J.         | 112 Arlington.              |
| Burnham, George E.         | " "                         |
| Burnham, Henry E.          | 1911 Elm.                   |
| Butman, Mrs. Jennie C.     | 43 Hanover.                 |
| Butterfield, Miss Annie C. | 6 High.                     |
| Call, W. R.                | 913 Elm, Room 46.           |
| Campbell, Miss S. Abigail  | 92 Walnut.                  |
| Carpenter, Frank P.        | Elm and West North.         |
| Carpenter, Mrs. Frank P.   | " " " "                     |
| Carpenter, Josiah          | Second National Bank.       |
| Carpenter, Mrs. Josiah     | 1667 Elm.                   |
| Carter, George C.          | 146 Walnut.                 |
| Cass, Edgar D.             | 578 Beech.                  |
| Cass, Mrs. Edgar D.        | " "                         |
| Castor, Mrs. Edgar E.      | 560 Beech.                  |
| Caswell, Fred M.           | River Road and West Clarke. |
| Challis, Frank H.          | 6 Pleasant.                 |
| Chalmers, Rev Thomas       | 590 Beech.                  |
| Chandler, Mrs. Fanny M.    | Myrtle Heights.             |
| Chandler, George Byron     | Amoskeag Bank.              |
| Chandler, George H.        | " "                         |

|                           |                 |
|---------------------------|-----------------|
| Chandler, Mrs. Helen M.   | 152 Pearl.      |
| Chandler, Mrs. Lucy R.    | Bay and North.  |
| Chase, C. Edwin           | 384 Walnut.     |
| Christophe, Sebastian     | 91 Penacook.    |
| Christophe, Mrs. S.       | " "             |
| Clarke, Mrs. Arthur E.    | River Road.     |
| Clarke, Mrs. Olive Rand   | 18 Brook.       |
| Clarke, William C.        | City Hall.      |
| Clement, Mrs. Clara V.    | 104 Parker.     |
| Clement, Miss Mary A.     | " "             |
| Cleworth, John            | 143 Myrtle.     |
| Cleworth, Mrs. John       | " "             |
| Cleworth, Mildred W.      | " "             |
| Clough, Albert L.         | Box 114.        |
| Clough, Mrs. L. B.        | 181 Walnut.     |
| Clough, Miss Nora B.      | 294 Pearl.      |
| Collins, Mrs. E. H.       | 59 Orange.      |
| Condon, Mrs. John W.      | 298 Hanover.    |
| Cornish, Miss Bertha K.   | 253 Central.    |
| Cooper, Miss Emma J.      | 85 Ash.         |
| Corey, William            | 488 Maple.      |
| Corson, Miss Annie R.     | 36 Ray.         |
| Crafts, George P.         | 91 Bay.         |
| Crafts, Mrs. George P.    | " "             |
| Cressey, William H.       | 266 Central.    |
| Crosby, Uberto C.         | 1855 Elm.       |
| Crosby, Mrs. U. C.        | " "             |
| Cross, David              | 1552 Elm.       |
| Cross, Mrs. David         | " "             |
| Currier, Mrs. Alice Blake | 673 Pine.       |
| Currier, Edward H.        | 488 Manchester. |
| Currier, Miss Mabel B.    | 225 Bridge.     |
| Currier, Mrs. Moody       | Myrtle and Ash. |
| Currier, Mrs. M. R.       | 42 Appleton.    |
| Custer, Miss Anna         | 245 Hanover.    |
| Dana, Miss Mary F.        | 142 Myrtle.     |
| Daniels, Miss Belle R.    | 586 Beech.      |
| Daniels, Miss Lucia H.    | " "             |
| Davis, Miss Edith H.      | 186 Lowell.     |
| Davis, Dr. George M.      | 596 Belmont.    |
| Davis, Mrs. George M.     | " "             |
| Davis, Miss May W.        | 186 Lowell.     |
| Dearborn, Mrs. J. Henry   | Pembroke, N. H. |
| Derby, Miss Lizzie M.     | 467 Amherst.    |

|                             |                            |
|-----------------------------|----------------------------|
| Dickey, Miss Esther M.      | 38 Avon.                   |
| Dodge, Mrs. Helen K.        | North Elm.                 |
| Dole, A. W.                 | 727 Beech.                 |
| Donahue, John J.            | 782 Beech.                 |
| Donahue, Mrs. Jessie E.     | " "                        |
| Dow, Miss Sarah E.          | 105 Ashland.               |
| Dow, Perry H.               | River Road and West North. |
| Downs, Mrs. Clara L.        | 105 Ash.                   |
| Dowst, Miss Ella M.         | 209 Walnut.                |
| Dowst, John                 | " "                        |
| Drew, Mrs. Annette H.       | 105 Ashland.               |
| Dustin, Charles R.          | 79 Penacook.               |
| Dustin, Mrs. C. R.          | " "                        |
| Eames, Mrs. Hortense H.     | 941 Chestnut.              |
| Eames, William M.           | 1089 Elm.                  |
| Edgerly, Clarence M.        | 886 Elm.                   |
| Ela, Miss Emma J.           | 585 Beech.                 |
| Elliott, Mrs. Medora W.     | River Road.                |
| Fairbanks, Miss Elsie D.    | 527 Hanover.               |
| Farmer, Mrs. Lucinda L.     | 145 Pearl.                 |
| Farnsworth, Rev. Charles H. | 962 Valley.                |
| Farrington, Mrs. L. Augusta | 251 Hanover.               |
| Felch, Miss Sadie C.        | 10 Tilton.                 |
| Fellows, Joseph W.          | 186 Lowell.                |
| Fellows, Mrs. J. W.         | " "                        |
| Ferren, Miss Kittie J.      | 97 Ash.                    |
| Fiske, Herbert H.           | 593 Union.                 |
| Fleck, Dr. C. E.            | 121 Pearl.                 |
| Fogg, Edward H.             | 302 Prospect.              |
| Fogg, Mrs. John Smythe      | River Road.                |
| Fogg, Miss Susy C.          | 302 Prospect.              |
| Foster, John                | 520 Beech.                 |
| Foster, Mrs. John           | 852 Elm, Room 9.           |
| Fracker, Miss M. Alma       | 297 Pearl                  |
| Francis, Miss Florence M.   | 740 Beech.                 |
| French, Mrs. Emma B.        | 693 Beech.                 |
| French, Dr. L. Melville     | " "                        |
| French, Mrs. Mary E.        | 313 Belmont.               |
| Gage, Miss Mary J.          | 482 Granite,               |
| Gault, John                 | 42 Brook.                  |
| Gay, Miss Annie M.          | 184 Myrtle.                |
| George, Miss Ethel L.       | 19 Appleton.               |
| Gill, William G.            | 1061 Elm.                  |

|                           |                           |
|---------------------------|---------------------------|
| Gillan, Miss Jean         | 757 Chestnut.             |
| Gooden, Miss Kate M.      | 466 Hanover.              |
| Graupner, Miss Amelia L.  | 215 Walnut.               |
| Graupner, Miss Hulda C.   | " "                       |
| Griffin, Mrs. Jennie G.   | 729 Chestnut.             |
| Hadcock, Mrs. William.    | 282 Prospect.             |
| Hale, Arthur H.           | First National Bank.      |
| Hale, Fred C.             | 112 Oak.                  |
| Hall, Miss E. Alfreda.    | 969 Valley.               |
| Hall, Miss Winnifred W.   | 385 Central.              |
| Hammond, Miss Edith       | 880 Union.                |
| Hardy, Frank H.           | 264 Prospect.             |
| Hardy, Mrs. Margaret S.   | " "                       |
| Hartshorn, Mrs. Minnie L. | 73 Liberty.               |
| Hassam, R. H.             | 559 Union.                |
| Hayes, Charles C.         | 15 Hazel.                 |
| Hazelton, Miss M. A.      | 235 Hanover.              |
| Head, Miss Caroline E.    | 283 Mast.                 |
| Heald, Frank E.           | 289 Concord.              |
| Heard, Arthur M.          | 746 Chestnut.             |
| Hemminger, G. R.          | 39 Hanover.               |
| Hicken, Miss Blanche E.   | River Road and W. Salmon. |
| Higgins, Edmund F.        | 75 Bay.                   |
| Higgins, E. Safford       | " "                       |
| Higgins, Wilson F.        | 119 Myrtle.               |
| Hoit, Miss Carrie E.      | Goffstown, N. H.          |
| Holt, Miss E. Blanche.    | 236 Walnut.               |
| Holton, Mrs. Maurice A.   | 647 Union.                |
| Hope, Miss Ella           | 265 Myrtle.               |
| Hope, Miss Lucy Maud      | " "                       |
| Hopkins, George I.        | 203 Walnut.               |
| Hosmer, Miss Grace B.     | 310 Myrtle.               |
| How, Miss Mabel L.        | 33 Walnut.                |
| Hubbard, Miss Martha W.   | 145 Pearl.                |
| Hunt, Mrs. N. P.          | 747 Union.                |
| Hunt, Miss Sara           | " "                       |
| Hurd, Henry N.            | 33 Walnut.                |
| Huse, Mrs. Isaac          | 97 Mammoth Road.          |
| Huse, Isaac Jr.           | 10 Hayes Avenue.          |
| Huse, William H.          | 210 Young.                |
| Huse, Mrs. W. H.          | " "                       |
| Hyde, T. McEwen.          | 228 Ash.                  |
| James, Mrs. Mary J.       | 235 Hanover.              |
| Jenkins, A. A.            | 1037 Elm, Room 56.        |

|                            |                            |
|----------------------------|----------------------------|
| Kemp, Miss Bertha L.       | 40 Water.                  |
| Kendall, Mrs. John M.      | 311 Central.               |
| Kendall, Willis B.         | 113 Myrtle.                |
| Kennard, Samuel C.         | 609 Beech.                 |
| Kennard, Mrs. S. C.        | " "                        |
| Kennedy, Mrs. Martha J.    | 319 Auburn.                |
| Knowlton, Mrs. Maud Briggs | 639 Chestnut.              |
| Lamb, Fred W.              | 452 Merrimack.             |
| Lamprey, Miss Alice Maud   | 395 Hanover.               |
| Lamson, Frank F.           | 145 Pearl.                 |
| Lane, Thomas W.            | 1937 Elm.                  |
| Langworthy, Willis H.      | 209 Walnut.                |
| Lemon, Miss Angie Mildred  | 584 Beech.                 |
| Livingston, Frank C.       | 859 Elm, Room 7.           |
| Lockhart, Rev. Burton W.   | 23 West Webster.           |
| Lockhart, Mrs. Frances U.  | " " "                      |
| Longa, Charles E.          | 10 North Adams.            |
| Lord, Miss M. Eugenia      | 341 Hanover.               |
| Mack, Miss Isabella G.     | 128 South Main.            |
| MacLeod, Mrs. Alberta A.   | 897 Elm.                   |
| MacLeod, Donald            | " "                        |
| Manning, Charles H.        | 1838 Elm.                  |
| Manning, Mrs. Frances Fay  | 1690 Elm.                  |
| Manning, Robert L.         | " "                        |
| Many, Rev. D. J. Jr.       | 116 Sagamore.              |
| Marr, Mrs. Frances         | 104 Appleton.              |
| Martin, E. L.              | 14 Market.                 |
| Martin, Frank E.           | 313 Bridge.                |
| Martin, Miss Winona M.     | 435 Hanover.               |
| McAllister, George I.      | 20 Hanover, Room 30.       |
| McAllister, Mrs. Mattie H. | 222 Massabesic.            |
| McCoy, Mrs. E. Southard    | 765 Union.                 |
| McDuffie, Charles H.       | Myrtle and Ash.            |
| McDuffie, Mrs. Laura B.    | " "                        |
| McKean, Miss Ellen E.      | 66 North Main.             |
| McLaren, Miss Emma L.      | 619 Union.                 |
| McLaren, H. N.             | " "                        |
| McLaren, Miss Mary E.      | " "                        |
| Means, Mrs. Elizabeth A.   | North Elm.                 |
| Merrill, Albert            | River Road and West North. |
| Merrill, Mrs. Alice S.     | 414 Merrimack.             |
| Merrill, Clarence R.       | " "                        |
| Mitchell, Miss Mary W.     | 341 Hanover.               |
| Mooar, Miss Linda Hunter,  | 280 Taylor.                |

|                           |                  |
|---------------------------|------------------|
| Mooar, Miss Mary Louisa   | 280 Taylor       |
| Moore, Miss Florence H.   | 267 South Main.  |
| Moore, Miss Helen M.      | 423 Hanover.     |
| Moore, Miss Marcia M.     | 88 Liberty.      |
| Moore, Mrs. William E.    | 69 Harrison.     |
| Morrill, Miss Florence M. | 40 Blodget.      |
| Morrill, Mrs. Hattie T.   | " "              |
| Morse, Mrs. Clara H.      | 129 Russell.     |
| Morse, Henry H.           | 84 Liberty.      |
| Morse, Miss Millicent S.  | 107 Parker.      |
| Morse, Dr. M. V. B.       | 129 Russell.     |
| Moulton, Miss Mary E.     | 54 Mast.         |
| Moulton, Miss Fannie D.   | 394 Concord.     |
| Murkland, William E.      | 35 North Main.   |
| Murphy, Miss Mary E.      | 341 Hanover.     |
| Nelson, James M.          | 314 Lake Avenue. |
| Nichols, William T.       | Union Office.    |
| Nolan, Thomas F.          | 70 Laurel.       |
| Normand, Miss Eva         | 206 Ash.         |
| Nutt, Miss May F.         | 604 Beech.       |
| Nutting, Fred S.          | 1029 Union.      |
| Olmstead, Mrs. Emma P.    | 726 Chestnut.    |
| Olzendam, Mrs. A. P.      | 42 Brook.        |
| Osgood, Anson G.          | 859 Elm.         |
| Osgood, Clinton S.        | 281 Central.     |
| Page, Miss Josephine W.   | 10 Adams.        |
| Parker, Miss Anna A.      | 269 Central.     |
| Parker, Miss Emma F.      | " "              |
| Parker, Henry W.          | 30 Granite.      |
| Parker, Miss Nellie C.    | 146 Pearl.       |
| Parker, Walter M.         | Manchester Bank. |
| Parker, Mrs. W. M.        | 1883 Elm.        |
| Patten, Miss Annie W.     | 254 Laurel.      |
| Peaslee, Mrs. Nellie D.   | 568 Beech.       |
| Peaslee, Robert J.        | " "              |
| Perkins, Miss Ada M.      | Ash and Orange.  |
| Perkins, David W.         | 490 Lake Avenue. |
| Perkins, Mrs. Frederick   | 52 Clarke.       |
| Phillips, Miss Grace A.   | 67 Belmont.      |
| Phinney, George H.        | 41 Hanover.      |
| Pipe, Frank S.            | 273 Central.     |
| Porter, Miss Olie M.      | 341 Hanover.     |
| Prince, Miss H. Velmer    | 75 Arlington.    |

|                             |                           |
|-----------------------------|---------------------------|
| Priest, Miss Electa M.      | 508 Chestnut.             |
| Priest, Mrs. Lucia Mead     | 27 Bay.                   |
| Reed, Miss Helen E.         | 233 Walnut                |
| Richardson, Charles L.      | Myrtle and Oak.           |
| Richardson, Edwin P.        | 318 Orange.               |
| Richardson, Miss Florence   | 481 Lincoln.              |
| Richardson, Mrs. Harriet B. | Myrtle and Oak.           |
| Richardson, Miss Harriet H. | 481 Lincoln.              |
| Richardson, Herbert E.      | 382 Central.              |
| Richardson, James M.        | " "                       |
| Richardson, Miss Theodora   | 481 Lincoln.              |
| Richardson, Miss Susan A.   | 382 Central.              |
| Robbins, Mrs. Ellen R.      | 290 Mc Gregor.            |
| Robbins, William K.         | Amoskeag Mfg. Co.         |
| Robinson, Dr. J. Franklin   | 15-16 Pickering Building. |
| Robinson, Mrs. Tillie F.    | 98 Bridge.                |
| Robinson, Ed. R.            | " "                       |
| Rogers, Miss Catherine      | 277 Laurel.               |
| Rowe, Miss Olive A.         | 118 Walnut.               |
| Ryder, Bayard C.            | Board of Trade.           |
| Sanborn, A. H.              | Amoskeag Mfg. Co.         |
| Sanborn, Mrs. Chas. E.      | 252 Lowell.               |
| Sargent, F. W.              | 741 Chestnut.             |
| Sawtell, Edward B.          | 286 Concord.              |
| Schæffer, Henri             | 170 Lowell.               |
| Scott, Mrs. Lydia A.        | 1949 Elm.                 |
| Shontell, Frederick W.      | 46 Hanover.               |
| Simmons, Mrs. E. M.         | 142 Lowell.               |
| Simmons, Walter W.          | " "                       |
| Simons, Mrs. Grace A.       | 42 Brook.                 |
| Slayton, Edward M.          | 1602 Elm.                 |
| Smith, Arthur J.            | 39 Hanover.               |
| Smith, Miss Emily E.        | 1687 Elm.                 |
| Smith, J. Brodie            | 46 Hanover.               |
| Smith, Miss Kate L.         | 57 Harrison.              |
| Smith, Leonard G.           | First National Bank.      |
| Smith, Miss May L.          | 560 Beech.                |
| Snell, A. E.                | 37 Lowell.                |
| Snow, Miss Nellie W.        | Myrtle and Ash.           |
| Spaulding, F. L. V.         | 193 Bridge.               |
| Stanton, Miss Theresa B.    | 587 Union.                |
| Staples, Rev. Charles J.    | 70 Blodget.               |
| Staples, Mrs. Grace D.      | " "                       |
| Stark, Augustus H.          | River Road.               |

|                           |                          |
|---------------------------|--------------------------|
| Stark, Mrs. A. H.         | River Road.              |
| Stearns, Miss Etta Lois,  | 296 Hanover.             |
| Stearns, H. A.            | 464 Amherst.             |
| Stevens, Victor E.        | N. H. Fire Insurance Co. |
| Straw, Herman F.          | 607 Chestnut.            |
| Straw, Mrs. H. F.         | " "                      |
| Stuart, Miss Alice M.     | 1966 Elm.                |
| Stuart, Miss Sara L.      | " "                      |
| Sturtevant, Mrs. Ira F.   | 205 Ash.                 |
| Taggart, Miss Alice C.    | 46 Brooklyn Avenue.      |
| Teeling, George A.        | 165 Sagamore.            |
| Thompson, A. W.           | 29 Market.               |
| Tolman, Miss Mary M.      | 593 Union.               |
| Tuson, Miss Eva F.        | 36 Appleton.             |
| Tuttle, Miss Hattie S.    | 344 Hanover.             |
| Tynan, Miss Mary G.       | 72 Oak.                  |
| Van Dyke, Miss Emma L.    | 302 Merrimack.           |
| Varick, John B.           | 537 Union.               |
| Varick, Mrs. Melusina H.  | " "                      |
| Varick, Mrs. Thomas R.    | 136 Lowell.              |
| Varick, Dr. W. R.         | 537 Union.               |
| Varney Miss Emma L.       | 220 Myrtle.              |
| Varney, Mrs. Harriet B.   | " "                      |
| Wadleigh, Mrs. Moses      | 179 Lowell.              |
| Walker, Miss Flora M.     | 146 Jewett.              |
| Walker, Thomas Jr.        | Goffs Falls.             |
| Walker, Mrs. Thomas Jr.   | " "                      |
| Waring, Miss Annie E.     | 247 Milford.             |
| Warren, Miss Marion F.    | 1687 Elm.                |
| Westcott, W. R.           | 40 Concord.              |
| Whittemore, L. B.         | 533 Beech.               |
| Whitten, John H.          | 2 Water.                 |
| Whitten, Mrs. J. H.       | " "                      |
| White, Louis B.           | 541 So. Main.            |
| White, Willie L.          | " "                      |
| Wiggin, Miss Ellen F.     | 581 Union.               |
| Willand, Miss Alta C.     | 16 Monroe.               |
| Willand, Miss Hattie O.   | " "                      |
| Williams, Mrs. Anna M.    | 471 Manchester.          |
| Williams, Miss Harriet A. | 161 Laurel.              |
| Williams, J. Arthur       | 544 Maple.               |
| Williams, Mrs. J. A.      | " "                      |

|                        |                 |
|------------------------|-----------------|
| Wilson, Miss Ida Belle | 304 Hanover.    |
| Winch, George          | 508 Manchester. |
| Wing, Miss Caroline E. | 331 Hanover.    |
| Woodbury, Gordon       | Union Office.   |
| Woodbury, Mrs. Gordon  | City.           |
| Woodruff, Harry G.     | Barre, Vt.      |
| Woodman, Miss Susie G. | 371 Massabesic. |
| Young, Harrie M.       | City Hall.      |
| Young, Miss Jennie     | 120 Myrtle.     |

## CORRESPONDING MEMBERS.

|                     |                 |
|---------------------|-----------------|
| Clarence M. Brooks, | Keene, N. H.    |
| Alvah A. Eaton,     | Seabrook, N. H. |
| Bela H. Emerson,    | Hooksett, N. H. |
| Sarah E. Parker,    | Pembroke, N. H. |
| J. H. Prescott,     | Foxboro', Mass. |
| John A. Wheeler,    | Milford, N. H.  |

## LIFE MEMBERS.

George Byron Chandler.                      Mrs. Aretas Blood.

## CUSTODIAN.

Walter S. Abbott.

ZOOLOGICAL AGENT, George E. Burnham.

AGENT, Sherburne Fowler, Pembroke, N. H.

## BRANCHES.

Suncook Improvement Association, Suncook Branch, No. 1.

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MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

SECTION A.

PHYSICAL SCIENCE.

Officers for 1901.

- CHARLES J. ABBOTT, *President*.  
HORACE T. CLAPP, *Vice President*.  
EDWARD J. BURNHAM, *Treasurer*.  
CHARLES R. DUSTIN, *Recording Secretary*.  
• FREDERICK W. SHONTELL, *Financial Secretary*.

EXECUTIVE COMMITTEE.

ALBERT L. CLOUGH.                      ARTHUR J. SMITH.  
HENRY A. STEARNS.

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**SECTION A.**

**PHYSICAL SCIENCE.**

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REPORTS OF MEETINGS—1901.

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Monday evening, January 7. The "Common Battery" System of Telephony, with drawings. J. S. WADSWORTH.

Monday evening, January 21. Discussion of the names of scientists and inventors suggested as candidates for the "Roll of Honor" in Electrical Discovery and Invention.

ALBERT L. CLOUGH AND EDWARD J. BURNHAM.

Monday evening, February 4. Lantern slide exhibition.

WILLIAM H. HUSE.

Monday evening, February 18. Description of the Method of Paper Making.

CHARLES R. DUSTIN.

Monday evening, March 4. The McDonough System of Color-Photography, with examples. WILLIAM H. HUSE.

Monday evening, March 18. The Radioactive Substances Radium and Polonium. (Supplementary to the address of October 1, 1900.)

HENRI SCHÆFFER.

Monday evening, April 1. The Respiration Calorimeter and the Researches of Prof. W. O. Attwater in Dietetics.

WILLIAM K. ROBBINS.

Monday evening, April 15. Cameras and Photography.

FRANK FRENCH.

Monday evening, May 13. The Electric Furnace and the Chemistry of High Temperatures. Illustrated by means of an electric furnace, in which calcium carbide was produced.

DR. ARNOLD L. BOSSI, assisted by ALBERT L. CLOUGH.

Monday evening, May 27. Extremely Low Temperatures and the Liquefaction and Solidification of Gases, with experiments with liquid carbon dioxide. HENRY A. STEARNS.

Monday evening, October 14. What Science Will Do for Training the Mind. REV. CHARLES J. STAPLES.

Monday evening, October 28. The New York-Buffalo Automobile Endurance Test. ALBERT L. CLOUGH.

Monday evening, November 11. Carbon, Graphite and the Diamond. DR. ARNOLD L. BOSSI.

Monday evening, November 25. The Nernst Electrolytic Lamp illustrated by specimens of this lamp and a variety of other forms of illuminant in regard to their relative value in color discrimination.

• HENRI SCHÆFFER AND ALBERT L. CLOUGH.

Monday evening, December 9. History of the Development of Photography. WILLIAM H. HUSE.

Monday evening, December 23. Excursion to the Local Telephone Exchange to inspect the "Common Battery" System, with preliminary address. W. R. WESTCOTT.

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MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

## NECROLOGY.

The following members of the Institute have died since its organization :

|                        |                    |
|------------------------|--------------------|
| JOEL DANIELS,          | May 18, 1899.      |
| JOHN C. FRENCH,        | January 8, 1900.   |
| CHARLES H. BARTLETT.   | January 25, 1900.  |
| LYMAN W. COLBY,        | June 21, 1900.     |
| HENRY CHANDLER,        | October 20, 1900.  |
| WILLIAM E. MOORE,      | October 22, 1900.  |
| FRED G. HARTSHORN.     | February 26, 1901. |
| DAVID B. VARNEY,       | March 25, 1901.    |
| ALLEN N. CLAPP,        | May 18, 1901.      |
| Mrs. EMELINE R. BALCH. | November 1, 1901.  |
| JOHN M. CHANDLER,      | December 5, 1901.  |

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MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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**SECTION B.**

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**ENTOMOLOGY.**

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**Officers for 1901.**

THEODORA RICHARDSON, *President.*

WALTER S. ABBOTT, *Vice President.*

SUSY C. FOGG, GEORGE E. BURNHAM, *Secretaries.*

CHARLES R. DUSTIN, *Treasurer.*

**EXECUTIVE COMMITTEE.**

LILLIAN G. BULLOCK, M. D. HULDA C. GRAUPNER,  
HELEN REED.

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**SECTION B.**

**ENTOMOLOGY.**

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REPORTS OF MEETINGS—1901.

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Monday evening, February 25. The last joint meeting for the season of Sections B and D. Mrs. F. W. Batchelder in the chair.

E. J. Burnham gave a general review of the Vertebrates with reference to the development of the brain.

Miss Susy C. Fogg having resigned as Secretary, by reason of her election to be President of Section F, George E. Burnham was selected by the Executive Committee to fill the vacancy.

Monday evening, March 11. Regular meeting; nine members present. The President in the chair.

Topic of the evening, "Wings of Diptera," illustrated with blackboard drawings by the President.

Monday evening, March 25. Regular meeting, the President in the chair.

Edward H. Fogg and Walter S. Abbott submitted the calendar for the preceding two weeks, which furnished the topic of discussion for the evening.

Monday evening, April 8. Regular meeting; eleven members present. The President in the chair.

The evening was devoted to a comparative study of the external characters of the Diptera.

Monday evening, April 22. Regular meeting; ten members present. The President in the chair.

An instructive paper by Miss Susy C. Fogg on the Orthop-

tera, with special reference to the Acrididæ and the Locustidæ.

Monday evening, May 6. Regular meeting; ten members present. The President in the chair.

E. J. Burnham discussed the Odonata with reference to differences between the Zygoptera and the Odonata.

Monday evening, October 7. Regular meeting; thirteen members present. The President in the chair.

The evening was devoted to the dissection and study of the mouth-parts of *Melanoplus femur-rubrum*, for the benefit and encouragement of new members.

Monday evening, October 21. Regular meeting; eleven members present. The President in the chair.

The evening was devoted to the dissection and comparative study of the mouth-parts of Coleoptera, specimens of *Cicindela* and *Harpalus* being selected.

Monday evening, November 4. Regular meeting; nine members present. The President in the chair.

The President gave a talk on *Papilio polyxenes*. The remainder of the evening being devoted to the study of the mouth-parts of *Colias philodice*.

Monday evening, November 8. Regular meeting; eleven members present. The President in the chair.

A paper was read by George E. Burnham on the *Catocalas*, with some account of the habits of these moths and personal experiences in collecting them.

E. J. Burnham exhibited egg masses of the White-marked Tussock-moth (*Notolophus leucostigma*) and reported that they were quite abundant on shade trees in the central portion of the city. The attention of the Street and Park Commissioners had been called to the matter, and a force of laborers was already engaged in collecting and burning the egg masses. The method pursued was that adopted several years ago, when this moth proved to be so costly a plague to Manchester. The laborers are equipped with ladders and poles, each of the poles having at one end an old-fashioned, three-tined steel table-fork, securely fastened and the tines bent at right angles to the handle.

The remainder of the evening was devoted to the dissection and study of the mouth-parts of the House fly, *Musca domestica*.

Monday evening, December 2. Date of regular meeting; no attendance by reason of the weather.

Monday evening, December 16. Regular and annual meeting; twelve members present. The President in the chair.

The annual report of the Secretary was read and approved. It showed that during the year the Section had held four joint meetings with Section D, and fourteen separate meetings. The average attendance was ten, the smallest being three and the largest thirteen.

In accordance with the vote of the section, the President named William H. Huse, Mrs. E. Southard McCoy and Miss Marcia Moore as a nominating committee. The committee reported the following list of officers, which was elected for the ensuing year:

*President*—Theodora Richardson.

*Vice President*—Walter S. Abbott.

*Secretary*—Edgar D. Cass.

*Treasurer*—Charles R. Dustin.

*Executive Committee*—Lillian G. Bullock, M. D., Herbert E. Richardson, Mrs. E. Southard McCoy.



# NOTES ON THE STUDY OF AQUATIC LIFE IN ITS ECONOMIC ASPECT.

BY EDWARD J. BURNHAM.

The benefits resulting from the systematic production of food from the soil are so obvious and the rude practice of the art is so simple that the fundamental principles of agriculture have been more or less clearly understood from very early times; but the possibilities in the intelligent cultivation of bodies of fresh water—of brooks, rivers, ponds and lakes—have been but dimly perceived, and the principles underlying such cultivation have scarcely been understood at all.

Few people think of fresh water fish culture as other than a means of affording amusement to the local angler or an additional attraction to the summer sojourner. With these ends in view, fish are hatched in large numbers and placed, while still young, in waters where it is blindly hoped they will thrive, but with no definite provision for their future needs. In many cases the money would be as intelligently and profitably expended for seed wheat to be cast at random to the four quarters of the earth.

The natural fecundity of fishes is so great, and their growth under favorable conditions is so rapid, that, given an adequate food supply, in suitable surroundings, the product, both in numbers and in weight, would be wellnigh incalculable; but in order that a considerable proportion of any species, whether hatched naturally or artificially, may reach maturity, all the circumstances affecting their food supply must be clearly understood, that the conditions may be, as far as possible, intelli-

gently controlled. The problem is intricate, and its factors, in the present state of knowledge, obscure; but the persistent and extended application of scientific methods of investigation cannot fail to result in its ultimate solution. A simple illustration will afford some idea of the nature of the problem and of the possibilities as well as of the difficulties involved.

A certain brook in a town near Manchester was long celebrated for its trout. Even to this day a considerable number of individuals of good size are found there, notwithstanding the almost incessant fishing for them. A brook weed grows abundantly in the rapids of this stream, clinging to the stones at the bottom. Snails in vast numbers feed upon this particular weed. The reproductive capacity of snails is great, and this brook weed is evidently a favorite food plant. It is known that the larvæ of horseflies (*Tabanidæ*) feed upon these snails, and, as might be expected, horsefly larvæ are abundant here. In this particular brook the singular little fishes known as "darters" (in this case some species or variety of *Etheostoma* as yet unidentified) are found in surprising numbers, lying half hidden among the stones. These feed upon the horsefly larvæ, and are themselves noted among anglers as a special bait for trout.

Here we have an apparently simple chain of cause and effect, from the brook weed to the trout. In most cases the inter-relations are more complicated; but even here the problem is not so simple as at first appears. If we jump at the conclusion that a stream which abounds in brook weed is therefore suitable for trout, we may fall into the error of that well-meaning person who, observing that civilized man uses the toothbrush, hastily inferred that if savages were equipped with toothbrushes, they, too, would be civilized.

In this seemingly simple chain we must know what are the conditions favorable to the growth of the brook weed, and why it is abundant in one stream but wanting in another. Of the snails we must know what other plants supply a portion of their food, and at what seasons, as well as what enemies other than the horsefly larvæ tend to check their increase; and we must learn as much or more of the horseflies themselves before we

can hope to understand the conditions of their larval stage. Finally, we must know the life history of the darter, from the egg to the moment that it is seized by the trout.

The horsefly larvæ can serve as food for the darters during only a portion of the year, and probably a relatively small portion. The trout may eat the darters all the year round, if the latter are sufficiently abundant; but the darters themselves must, at some period of the year, find other food than the larvæ of horseflies. We must know what this other food is, at what time it is found in greatest abundance and where; what conditions are favorable or hostile to its development—in a word, before we can say intelligently and confidently that a given stream or pond is properly "stocked" with the necessary food supply, and is, therefore, ready for the further "stocking" with trout or other fish, we must know all the facts relative to all the life, both animal and vegetable, in the water, on the shores, and in the air above.

Some of this work has already been done by those entomologists who have made a study of the structure and relationships of certain groups of aquatic insects, but much more remains to be accomplished before anyone can speak with certainty upon the subject of stocking even a single stream or pond. The State of New York recently took a long step in the right direction. Under the supervision of the State Entomologist, Dr. E. P. Felt, an entomologic field station was established at Saranac Inn, in the Adirondacks, in connection with the State fish hatchery at that place. The station was placed in charge of Dr. James G. Needham, Professor of Biology at Lake Forest University, whose report upon Aquatic Insects in the Adirondacks, issued as Bulletin 47 of the New York State Museum, is by far the most valuable contribution to our knowledge of this important subject which has yet appeared.

But before Professor Needham's report came to hand, an unusual opportunity for the study of the return of plant and animal life to a body of water, rendered utterly barren of both by mechanical means, was presented through the enterprise and

courtesy of Gordon Woodbury, Esq. On Mr. Woodbury's estate in Bedford there is an artificial pond, which, a century and a half ago, supplied power for a sawmill, but which for many years has been retained for pleasure only. This pond, having originally an area of about five and one-half acres, is formed by damming Cold Brook, a stream of considerable volume and great activity, which flows sinuously down a valley of its own making through an extensive forest from the sand plains and low hills beyond. This brook, in the long period since the first construction of the dam, by bringing down sand from the plains, and debris from the woodland, had filled fully two-thirds of the original area of the pond and greatly lessened the depth of the remaining portion.

Mr. Woodbury decided upon an extensive excavation, and in August of the present year the contractor began operations. The work was completed in November; silt and miscellaneous detritus of an average depth of three feet and ten inches having been removed from an area of five and one-half acres. The excavation was so thorough that, with the exception of a small island upon which shrubs and trees were left standing, there was not a vestige of plant or animal life in the entire area. The gate was closed on November 21, and three days later water began flowing over the dam.

Mr. Woodbury having previously expressed a readiness to co-operate in any investigations that might be undertaken, the Council of the Institute requested Mr. Frederick W. Batchelder to make a study of the return of aquatic plants to this area, while the present writer was similarly requested to make careful observations and report upon the progress of the natural restocking of the pond with animal life.

On December 21, one month from the closing of the gate, the first formal investigation was made, with the assistance of George E. Burnham, Secretary of the Entomological Section of the Institute. Insects had ceased flying before the excavation was completed in November, and there were but two ways open by which aquatic life could find entrance to the pond—one by the brook, and the other from a marsh of some extent, which had

been connected with the pond by four eight-inch water-mains, laid side by side at a level with the bottom. It was thought that caddis-fly larvæ and dragon-fly nymphs might have found their way through these pipes, and the first observation was accordingly made at the point in the pond where the water-mains discharge a small stream from the marsh. A hole two feet square was cut in the ice, which was found to be five and one-half inches thick. The water was three feet deep, and at a depth of two feet its temperature was 34 degrees Fahrenheit.

- The temperature of the atmosphere was 16 degrees at 11 o'clock A. M.

The dredging was done with a sieve net, similar to that figured and described in part O of the U. S. Nat. Mus. Bul. 39, p. 4, and used with such success by Professor Needham in his Adirondack investigations. There was no mud, the excavation having been made down to the original solid bottom of the pond. The dredge brought up large quantities of oak and maple leaves which the wind had blown into the water. Many of these bore the familiar markings of the leaf miners, and excrescences caused by various gall insects, but there was no trace of aquatic life to be found upon them. By thrusting the dredge under the ice, it was made to explore an area of fully sixteen square feet, but leaves and small twigs were the only objects brought up from the bottom; and there was no indication of life in the water.

An investigation was next made at the mouth of the brook, which had already begun the formation of a "cone" of clear sand. As the brook itself was open, and the ice of the pond was firm, it was possible, after first cutting away the thin ice along the edge, to make a thorough examination of a considerable area; but the sand yielded no indication of life of any kind. It therefore remained only to find what forms of life there might be in the brook.

A freshet, that occurred two days previously, had caused the brook to bring down an unusual quantity of clear, yellow sand, which covered the bottom evenly and completely to the foot of the first rapids, about forty rods up the stream. The dredge,

although employed diligently, revealed nothing until the rapids were reached.

At this point the brook flows with a swift current over a rocky bottom and in a curve approximating an arc of ninety degrees. At the foot of the rapids, on the inner side of the curve, a rivulet enters the brook by a ditch, evidently dug many years ago for the purpose of drainage. The area selected for examination was six feet in length and two in breadth, extending along the inner curve of the brook, including the mouth of the ditch—one foot—and five feet of the rapids. A fine wire netting, of the sort used for window screens, was arranged to enclose the area selected, but a quantitative examination was found to be physically impossible by reason of the intense cold. For the purposes of a qualitative study, however, it is believed that sufficient care was exercised to render the collection complete. This collection comprised :

- 10 darters (probably a variety of *Etheostoma olmstedii* Storer.)
- 3 salamanders (young of *Amblyostoma* ; probably *A. punctatum*, as the characteristic dorsal groove was very distinct.)
- 2 fresh-water mussels (*Unio*.)
- 8 dragon-fly nymphs (all of the same species, and of the *Libelluline* type.)
- 14 stone-fly nymphs (evidently two species, but all young and immature).
- 78 may-fly nymphs.
- 21 caddis-fly larvæ.
- 18 dipterous larvæ.

The caddis-fly larvæ—some bearing cases of sand, some of sticks, some of leaves, and some of the flattened needles of the hemlock—were found at the mouth of the ditch, with the exception of the sand-case-bearers, which were abundant at the foot of the rapids, but minute, with only the beginnings of cases. The clams were found in the rapids, and all the remaining forms of life included in the list were also found in the rapids, among or beneath the stones at the bottom. The

• darters, protected by their color, lay half hidden among the stones, looking more like tadpoles than fish. The dragon-fly nymphs also rested among the rocks, motionless, awaiting their prey—or, quite as likely, in that temperature, indifferent alike to food and their surroundings. The may-fly larvæ literally swarmed here; multitudes must have been hatched within a comparatively short time. The seventy-eight counted were of fair size—from one-half to three-quarters of an inch in length—but no attempt was made to secure the myriads of tiny individuals, seemingly but recently from the egg. The stone-fly nymphs were beneath the stones, and many more than those counted might have been secured had the cold not made further collecting too tedious to be endured. The salamanders were also beneath stones, but solitary. The dipterous larvæ, footless, and nearly an inch in length, appeared to roll aimlessly about in the swift current, but none was seen to be carried down the stream, although a careful watch was kept for such an accident.

It is believed that the results of the investigation tend to prove: 1) that the pond was as barren of life at the end of a month as it was when first filled with water; 2) that the nymphs and larvæ of aquatic insects, belonging to the groups mentioned in this paper, do not wander from their stations in search of food, since it was impossible for those in the marsh or in the brook to know that the pond contained no food for them; 3) that even a flood, such as prevailed two days before the examination, does not avail to carry insect and other forms of aquatic life down stream against their will; 4) that while the water of the pond has been made barren by mechanical means, Cold Brook itself, at least in its numerous rapids, teems with animal life; 5) that the restocking of the pond with insect life, when it occurs, will be accomplished chiefly by oviposition, and not by the migration or transportation of insects in the larval stage.



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MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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**SECTION C.**

**BOTANY.**

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**Officers for 1901.**

MRS. ALBERT O. BROWN, *President.*  
MISS CAROLINE E. WING, *Vice President.*  
F. W. BATCHELDER, *Secretary.*  
MISS ELLEN F. WIGGIN, *Treasurer.*

**EXECUTIVE COMMITTEE.**

MISS CAROLINE E. WING, REV. CHAS. J. STAPLES,  
MISS ISABELLE R. DANIELS.

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SECTION C.  
BOTANY.

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REPORTS OF MEETINGS.

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Tuesday evening, January 8. Regular meeting; the President in the chair.

Slides prepared by Mr. E. J. Burnham from cross sections of rose geranium leaf and petiole of strawberry, and cells of elder pith and cork, were examined by aid of the microscope.

Adjourned to January 22.

Tuesday evening, January 22. Regular meeting; the President in the chair.

An informal discussion was held relative to the advisability of purchasing a compound microscope for the section. The following herbarium specimens were studied: *Lycopodium lucidulum*, *inundatum*, *obscurum*, *clavatum* and *complanatum*.

With his microscope, Mr. Burnham showed the spore-cases and spores of *L. obscurum*.

Adjourned to February 5.

Tuesday evening, February 5. On account of the extreme cold the attendance was small and the meeting informal.

Adjourned to February 19.

Tuesday evening, February 19. Regular meeting; the President in the chair.

The President led the meeting in the study of ferns, reviewing the work of previous meetings and examining several herbarium specimens of species not hitherto studied.

Adjourned to March 5.

Tuesday evening, March 5. Regular meeting; the President in the chair.

The study of ferns was continued and special examination

was made of *Dryopteris Braunii*, *Goldieana* and *marginalis* from herbarium specimens.

Adjourned to March 19.

Tuesday evening, March 19. Regular meeting; the President in the chair.

A review of the work of the last meeting was given by Miss Lord, after which the genus *Asplenium* was studied with the help of herbarium specimens of the following species: *A. Platyneuron*, *Trichomanes montanum* and *angustifolium*.

Adjourned to April 2.

Tuesday evening, April 2. Regular meeting; the President in the chair.

Adjourned to April 16.

Tuesday evening, April 16. Regular meeting; the President in the chair.

Adjourned to April 30.

Tuesday evening, April 30. Regular meeting.

Adjourned to May 14.

Tuesday evening, May 14. Regular meeting; the President in the chair.

Adjourned to May 28.

Tuesday evening, May 28. Regular meeting.

Adjourned to June 11.

Tuesday evening, June 11. Regular meeting; the President in the chair.

The genus *Osmunda* was studied from fresh specimens of *O. Claytoniana* and *cinnamomea*. Two early grasses, *Oryzopsis juncea* and *asperifolia*, were analyzed and identified. The following flowers of the season were studied: *Erigeron bellidifolius*, *Senecio aureus*, *Clintonia borealis*, *Pedicularis Canadensis*, *Sisyrinchium angustifolium* and *Myosotis verna*.

Adjourned to June 25.

Tuesday evening, June 25. Regular meeting; the President in the chair.

The time was devoted to study of the flowers of the season, especially *Habenaria fimbriata* (*grandiflora*.)

Adjourned to October 1.

Tuesday evening, October 1. In the absence of both President and Vice President, Rev. C. J. Staples was chosen chairman of the meeting.

There being no special program for the evening, the time was occupied with the discussion of plans for the work of the season.

Fresh plants of the orchid *Spiranthes cernua* were exhibited, and the incorrectness or incompleteness of the generic description in the manuals demonstrated, the specimens showing plainly both a three-ranked and a one-ranked arrangement of the flowers in the spike. It was stated by the collector that from 30 to 40 per cent of the plants in this vicinity displayed the one-ranked inflorescence.

Discussion followed concerning lectures, a microscope, a course of study and the assignment of special talks or papers. Among the subjects suggested were these: Fungi, The Spore Surface of Mushrooms, Histology, Grasses, Ecology.

The Council having recommended that the meetings of the section hereafter be arranged so as to bring them on the first and third, or the second and fourth occurrence of the accustomed week day in the month, so as to avoid complications resulting from the fifth occurrence of the day, it was voted that the meetings of Section C be held on the first and third Tuesdays in each month during the season.

It was voted to request Mrs. Maria L. Clough to give a paper or talk on "Fungi" at the next meeting.

Adjourned to October 15.

Tuesday evening, October 15. Regular meeting; the President in the chair.

After an informal talk by Mr. Burnham on apparatus for microscopic work, Mrs. Clough led the section in a study of Mushrooms, describing their place in the natural order of development, and the habits of the poisonous and edible species.

Fresh plants were used in illustration, and the spores were examined microscopically.

Adjourned to November 5.

Tuesday evening, November 5. Regular meeting; the President in the chair.

Specimens brought in were examined; among them, *Osmorhiza longistylis*, *Geranium Robertianum* and *Chiogenes serpyllifolia*. The first named was reported as found also in Manchester. Fresh plants of *Dryopteris cristata Clintoniana* were exhibited and examined.

Adjourned to November 19.

Tuesday evening, November 19. Regular meeting.

On account of very inclement weather, the attendance was small and the meeting was informal.

Adjourned to December 3.

Tuesday evening, December 3. Annual meeting.

The lecture on "Ecology" by Prof. L. H. Bailey of Cornell University was given this evening at the vestry of the Franklin Street church. After the lecture, there being a sufficient number of members present to constitute a quorum for business, a meeting was called to order by the Secretary, in the absence of the President and Vice President, by reason of the very severe snowstorm. It was then voted to adjourn the annual meeting until the time of the next regular meeting.

Adjourned to December 17.

Tuesday evening, December 17. Annual meeting; the President in the chair.

This being the adjourned annual meeting, after the reading of the records of the last two meetings, the section proceeded to elect officers for the ensuing year. A nominating committee consisting of Miss Mack, Miss Moore and Miss Woodman was appointed by the chair to prepare a list of names to be voted upon. After consultation the committee reported the following list of names:

*President*—Miss Isabelle R. Daniels.

*Vice President*—Miss Caroline E. Wing.

*Secretary*—Mr. F. W. Batchelder.

*Treasurer*—Miss Ellen E. McKean.

*Executive Committee*—Miss Caroline E. Wing, Rev. Chas. J. Staples, Miss Mary F. Barnes, and the President and Secretary *ex officio*.

It was voted that the Secretary be authorized to cast one ballot for the above list of names. This having been done by the Secretary, the above named persons were declared duly elected as officers of Section C for the year 1902.

It was announced that at the next meeting, Mr. Batchelder would give a talk on "Plant Societies in Manchester," a local adaptation of Prof. Bailey's recent lecture on "Ecology."

Adjourned to January 7, 1902.



## INTRODUCTORY NOTE.

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The total destruction of the herbarium of the Institute by fire on the evening of January 14, 1902, has placed the compiler in an embarrassing situation, since it has deprived him of the usual vouchers. He has accordingly been careful to include nothing in the following list which could not be positively identified by memory or by the notes of accurate and experienced observers.

He desires to express his indebtedness to his friend Dr. A. A. Briggs, of Andover, for invaluable assistance in the preparation of the list of Carices.



# ADDITIONS

## TO THE

## PRELIMINARY LIST OF PLANTS

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COMPILED BY FREDERICK W. BATCHELDER.

### Lycopodiaceæ.

**Lycopodium chamæcyparissus** R. Br. Gilford. Rare?

### Typhaceæ.

**Typha angustifolia** L. Windham. Geo. Dimmock. Rare.

### Gramineæ.

\*1. **Syntherisma filiformis** (L.) Nash.  
(see notes.) Rock Rimmon, Manchester. Rare.

\*2. **Panicum autumnale** Bosc.  
Bank of Merrimack River, Bow. Rare.

\*3. **Sporobolus vaginæflorus** (Torr.) Wood.  
Manchester. Concord. Not rare.

**Agrostis coarctata** Ehrh.  
Chester. Rare?

• **Avena striata** Michx.  
Doe Mountain, Laconia. Rare?

**Phragmites Phragmites** (L.) Karst.  
Hudson. Rare.

**Nardus stricta** L.  
Andover. Dr. A. A. Briggs. Accidental.

**Agropyrum caninum** (L.) R. & S.  
Laconia. Rare.

### Cyperaceæ.

**Carex folliculata** L. Not uncommon.

**intumescens** Rudge. Common.

**lupulina** Muhl. Common.

|                            |                   |
|----------------------------|-------------------|
| <b>utriculata</b> Boott.   | Common.           |
| <b>monile</b> Tuckerm.     |                   |
| <b>Tuckermani</b> Dewey.   |                   |
| <b>retrorsa</b> Schwein.   |                   |
| <b>lurida</b> Wahl.        | Common.           |
| <b>Baileyi</b> Britton.    | Common southward. |
| <b>Pseudo-Cyperus</b> L.   |                   |
| Laconia. Dr. A. A. Briggs. |                   |
| <b>comosa</b> Boott.       |                   |
| Auburn.                    |                   |
| <b>riparia</b> Curtis.     | Common.           |
| <b>scabrata</b> Schwein.   |                   |
| Andover. Dr. A. A. Briggs. |                   |
| <b>vestita</b> Willd.      |                   |
| Manchester.                | Not rare.         |
| <b>filiformis</b> L.       | Common.           |
| <b>stricta</b> Lam.        | Common.           |
| <b>Goodenovii</b> J. Gay.  | Rather common.    |
| <b>prasina</b> Wahl.       |                   |
| Manchester.                | Common.           |
| <b>crinita</b> Lam.        | Common.           |
| <b>gynandra</b> Schwein.   | Common.           |
| <b>virescens</b> Muhl.     | Common.           |
| <b>costellata</b> Britton. |                   |
| Goffstown. Bristol.        |                   |
| <b>gracillima</b> Schwein. | Common.           |
| <b>formosa</b> Dewey.      |                   |
| Goffstown.                 |                   |
| <b>longirostris</b> Torr.  |                   |
| Franklin.                  |                   |
| <b>arctata</b> Boott.      |                   |
| <b>tenuis</b> Rudge.       | Common.           |
| <b>grisea</b> Wahl.        | Not common.       |
| <b>pallescent</b> L.       | Common.           |
| <b>conoidea</b> Schk.      |                   |
| Manchester. Salisbury.     |                   |
| <b>laxiflora</b> Lam.      | Common.           |

|  |               |
|--|---------------|
| <b>laxiflora patulifolia</b> (Dewey.) Carey. |               |
| Andover. Dr. A. A. Briggs.                   |               |
| <b>digitalis</b> Willd.                      |               |
| Concord. Andover.                            |               |
| <b>pedicellata</b> (Dewey.) Britton.         |               |
| <b>Pennsylvanica</b> Lam.                    | Common.       |
| <b>Novæ-Angliæ</b> Schwein.                  |               |
| Concord. Hill.                               |               |
| <b>umbellata</b> Schk.                       | Common.       |
| <b>leptalea</b> Wahl.                        | Common.       |
| <b>stipata</b> Muhl.                         | Common.       |
| <b>vulpinoidea</b> Michx.                    | Common.       |
| <b>tenella</b> Schk.                         | Common.       |
| <b>Muhlenbergii</b> Schk.                    |               |
| Franklin.                                    |               |
| <b>sterilis</b> Willd.                       | Common.       |
| <b>canescens</b> L.                          | Common.       |
| <b>brunnescens</b> (Pers.) Poir.             |               |
| <b>bruunescens gracilior</b> Britton.        |               |
| Andover.                                     |               |
| <b>trisperma</b> Dewey.                      | Not uncommon. |
| <b>Deweyana</b> Schwein.                     | Not uncommon. |
| <b>siccata</b> Dewey.                        | Common.       |
| <b>tribuloides</b> Wahl.                     |               |
| <b>scoparia</b> Schk.                        | Common.       |
| <b>cristatella</b> Britton.                  | Not uncommon. |
| <b>tenera</b> Dewey.                         | Common.       |
| <b>festucea</b> Willd.                       | Not uncommon. |

**Juncaceæ.**

|                                 |               |
|---------------------------------|---------------|
| <b>Juncus effusus</b> L.        | Common.       |
| <b>bufonius</b> L.              | Common.       |
| <b>tenuis</b> Willd.            | Very common.  |
| <b>Greenei</b> Oakes & Tuckerm. | Not uncommon. |
| <b>marginatus</b> Rostk.        | Not uncommon. |
| <b>pelocarpus</b> E Meyer.      | Not uncommon. |
| <b>articulatus</b> L.           |               |

**Canadensis** J. Gay.  
**acuminatus** Michx.

Common.

**Orchidaceæ.**

\*4. **Pogonia pendula** Lindl.

Meredith. F. W. Batchelder.

Rare.

\*5. **Cypripedium aretinum** R. Br.

Laconia. F. W. Batchelder.

Rare.

**Myricaceæ.**

**Myrica cerifera** L.

Salem. Geo. Dimmock.

Rare.

**Aristolochiaceæ.**

**Asarum Canadense** L.

Salem. Geo. Dimmock.

Rare.

**Portulacaceæ.**

**Claytonia Virginica** L.

Rare.

**Caryophyllaceæ.**

**Anychia dichotoma** Michx.

Windham.

Rare.

**Rosaceæ.**

**Potentilla pumila** Poir.

**Papilionaceæ.**

**Desmodium paniculatum** D. C.

**Dillenii** Darl.

**Vitaceæ.**

**Vitis riparia** Michx.

Bank of Merrimack River, Concord.

**Umbelliferæ.**

**Osmorrhiza longistylis** D. C.

**Ericaceæ,**

**Rhododendron canescens** Porter.

**Solanaceæ.****Physalis pruinosa** L.

Manchester.

Rare.

**Schrophulariaceæ.****Ilysanthes attenuata** (Muhl.) Small.

Concord.

**Castilleja coccinea** (L.) Spreng.

Pelham.

Rare.

**Orobanchaceæ.****Conopholis Americana** (L. f.) Wallr.

Meredith.

Rare.

**Rubiaceæ.****Mitchella repens** L.

Common.

Accidentally omitted from list of 1899.



## NOTES.

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\*1. Rock Rimmon, in West Manchester, is an exposed ledge, precipitous on the east and south sides and inclined gradually on the west and north sides. It is an island of rock in a lake of gravel. Close to the eastern base is a small, boggy swamp. It follows that here, within a very limited area, are ecological conditions favorable to a great variety in the flora. The following names of rarer and unexpected species may be of interest: *Quercus Prinus* L., *Rhus venenata* D C., *Asplenium platyneuron* (L.) Oakes. (rare in this vicinity,) *Syntherisma filiformis* (L.) Nash., *Eragrostis capillaris* Nees., *Chrysopogon nutans* Benth.

\*2. Dr. A. A. Briggs of Andover, while wheeling along the river road in Bow, near the Hooksett line, found several tufts of this species and kindly furnished the compiler with specimens. The latter soon after (Sept. 22) visited the locality and found the grass scattered along by the side of the road, which there runs close to the river, for about a quarter of a mile. In all there were 19 tufts, large and small. This abundance would indicate that it must have been established for some time. The land in the vicinity is subject to overflow from freshets, and is largely covered with very fine sand. Most of the grass was growing in this sand.

\*3. Two forms of *Sporobolus* of this group are common in Manchester and Concord, one appearing to answer the description of *S. neglectus* Nash., the other that of *S. vaginæflorus* (Torr.) Wood. In the former the glumes are nearly of equal length; in the latter they are of four decidedly different lengths, increasing regularly in length from the short lower empty glume to the long-acuminate almost awned palet. Frequently the palet is so exaggerated as to strongly resemble that of *S. asper*. The two forms usually grow separately. The one which is here provisionally called *S. vaginæflorus* sometimes forms a close turf in moister situations, thus contrasting with the usual scattered

condition of both forms when growing in drier localities or in sand. Aside from the difference in the proportionate length of the glumes the plants in the two forms appear to be alike. These notes are given simply for what they may be worth in the reduction of this unsettled group.

\*4. A station of this beautiful little orchid was discovered by the compiler on the shores of Lake Winnepesaukee, Aug. 12, 189-. At this time the plants were very abundant, often growing in dense clusters or colonies. In a single patch of leaf-mold, about 14 by 8 inches in extent, no less than 120 plants were found in full flower. The plants behaved badly in drying, and specimens prepared for herbaria were very unsatisfactory. The next visit to the station was on Aug. 27, 1897, when the plants were very scarce and poorly developed. The last visit was on Aug. 18, 1901. While not as abundant as when the station was discovered, the plants were then sufficiently numerous and in good condition. A number of clumps and of single plants with the leaf-mold attached were packed in tin boxes with moss and successfully transported, reaching botanical friends in Massachusetts in fine condition. The collector having suspected, from both the habitat and the habit of the plants, that they were to some extent saprophytic or symbiotic, suggested to one of the recipients of his plants a critical examination of the root system. The examination tended to prove that the plants are hemisaprophytes, deriving organic food from the humus. It also showed a particularly clear case of "mykorrhiza," certain fungi having penetrated the tissues of the root and also sent hyphæ from it in all directions, so that the root looked as if clothed with root hairs.

The paleness of the parts above ground and the feeble development of chlorophyll are very noticeable. As far as observed, the plants all grow in leaf-mold and have no attachment to the soil beneath. In fact, the layer of leaf-mold is usually superposed on rock and the plants are most abundant in the little hollows between angular fragments of the rock where little or no other soil can have accumulated. The trees in the locality are

mostly hemlock, maple, oak and beech, meeting white pine on the upper part of the slope. Other interesting plants of the locality are *Aphyllon uniflorum* T. & G., *Conopholis Americana* (L. f.) Wallr, *Epiphegus Virginiana* Bart., *Monotropa uniflora* L., *M. Hypopitys* L.

\*5. A small clump or rather tuft of these plants was found in Laconia near Doe Mountain, Aug. 30, 1897. The station has been visited almost every year since, but although careful search has been made there and in the vicinity, not a single plant has been found; another illustration of the evanescent habit of some of the rarer orchids.



## NEW STATIONS OF SOME RARER PLANTS.

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|  |            |            |
|--|------------|------------|
| <b>Onoclea Struthiopteris</b> (L.) Hoffm.  | Hollis.    | Deering.   |
| <b>Woodsia obtusa</b> (Spreng.) Torr.      | Millville, | Concord.   |
| <b>Camptosorus rhizophyllus</b> (L.) Link. |            | Hudson.    |
| <b>Rhus venenata</b> D C.                  |            | Concord.   |
| <b>Ilex lævigata</b> Gray.                 | Windham.   | Concord.   |
| <b>Hudsonia ericoides</b> L.               |            | Hooksett.  |
| <b>Rhododendron maximum</b> L.             |            | Hopkinton. |
| <b>Limnanthemum lacunosum</b> Griseb.      |            | Concord.   |
| <b>Pentsemon pubescens</b> Solander.       |            | Concord.   |
| <b>Sambucus racemosus</b> L.               |            | Concord.   |

## SUMMARY.

1899—1901.

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|                                     |     |
|-------------------------------------|-----|
| Number of Families represented..... | 117 |
| Number of Genera represented.....   | 381 |
| Number of Species.....              | 899 |
| Number of Varieties .....           | 15  |
|                                     |     |
| Total Number of Names.....          | 914 |



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MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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**SECTION D.**

**ORNITHOLOGY.**

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**Officers for 1901.**

Mrs. F. W. BATCHELDER, *President.*

MRS. J. C. BICKFORD, *Vice President.*

MISS MAY W. DAVIS, *Secretary.*

**EXECUTIVE COMMITTEE.**

MR. EDWARD H. FOGG, MISS THEODORA RICHARD-  
SON, MRS. J. C. BICKFORD.

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## SECTION D.

# ORNITHOLOGY.

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### REPORTS OF MEETINGS.

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Monday evening, February 25. Joint meeting of Sections B and D, the President of Section D in the chair; Mr. Edgar D. Cass Secretary pro tem.

This being the last joint meeting for the season of Sections B and D, a review of the biological work undertaken during the fall and winter was presented by Mr. E. J. Burnham, who traced the development of the brain from the simple notochord of the lancelets progressively upward to the extremely complex organ possessed by the highest vertebrates.

At the close of the review a vote of thanks was extended to the speaker for his able and generous assistance in maintaining the interest of the joint meetings.

Adjourned to March 20.

Wednesday evening, March 20. Regular meeting; the Vice President in the chair; Miss Mary F. Dana Secretary pro tem.

Mr. E. H. Fogg, for the Executive Committee, reported a plan of work for the ensuing season. This was to consist of lectures, papers and readings on topics of interest to the Section. The report was accepted.

By request, Miss Dana read for the second time her paper on "The Theory of the Migration of Birds." This was followed by a discussion. An article in *Bird Lore* by Mr. William Brewster, on "A Study of a Lincoln's Sparrow," was read. Members of the Section were urged to look carefully for this species, since it doubtless passes through the Merrimack valley in the migrations.

The only birds reported as seen to date were bluebirds, robins and song sparrows.

Adjourned to April 17.

Wednesday evening, April 17. Regular meeting; Miss Theodora Richardson in the chair.

An article on "Boys and Shotguns" was read by Mr. Walter Abbott, and members were urged to encourage other methods of bird study for the young people.

Mrs. M. H. Varick gave, with the help of photographs, an account of sixty species of birds seen in Florida during a recent visit there in early spring.

Birds to date were reported as follows: House sparrow, chickadee, downy woodpecker, crow, bluejay, bluebird, robin, tree sparrow, song sparrow, butcher bird, junco, purple finch, flicker, phebe, vesper sparrow, red-breasted nuthatch, pine warbler, field sparrow, rusty blackbird, bronzed grackle, dusky duck, marsh hawk, herring gull, redwing, white-breasted nuthatch, goldfinch, fox sparrow, hermit thrush, meadow lark, tree swallow, sharp-shinned hawk, fish hawk—32 species in all.

Adjourned to May 1.

Wednesday evening, May 1. Regular meeting; the Vice President in the chair; Miss Lord Secretary pro tem.

Mr. E. D. Cass gave a talk on "Bird Songs." The following additions were made to the list of birds seen to date: Redpoll linnet, golden-crowned kinglet, broad-winged hawk, chip-ping sparrow, kingfisher, ruby-crowned kinglet, black and white creeper, red crossbill.

Adjourned to May 15.

Wednesday evening, May 15. Regular meeting; the President in the chair.

An article was read on the planting of trees and shrubs, the fruit of which would be attractive to birds. Suggestions were made as to furnishing dishes or pools of water in gardens and lawns for birds to drink from and bathe in.

The President gave a review of the subject of Bird Legislation and Protection, from the time, about fifty years ago, when

definite laws were first passed to the recent legislative enactments in the different States and in Congress. It was stated that as long ago as in 1864 laws for the protection of birds were enforced in the District of Columbia.

The following additions were made to the bird list of the season: White-throated sparrow, 6th; least flycatcher, 8th; warbling vireo, 9th; brown thrasher, chewink, 11th; Wilson's thrush, myrtle warbler, black-throated green warbler, blue-headed vireo, swift, spotted sandpiper, 12th; catbird, rose-breasted grosbeak, Baltimore oriole, yellow warbler, Maryland yellow-throat, ovenbird, 14th; kingbird, hummingbird, 15th; white-crowned sparrow, 17th; bobolink, scarlet tanager, redstart.

Adjourned to May 29.

Wednesday evening, May 29. Regular meeting; the President in the chair.

The evening was devoted to consideration of birds of the season. Mrs. Varick gave a list of 65 species seen from May 16 to 24 inclusive. The following were the additions to the bird list: Ruffed grouse, sparrow hawk, hairy woodpecker, nighthawk. Traill's flycatcher, cowbird, indigo bird, purple martin, bank swallow, barn swallow, red-eyed vireo, Nashville warbler, parula warbler, black-throated blue warbler, magnolia warbler, chestnut-sided warbler, Blackburnian warbler, Canadian warbler, wood thrush, olive-backed thrush, whippoorwill, least sandpiper, black-cap warbler, black-poll warbler, cedar bird. Total number of species reported by members since January 1, 1901, 84.

Adjourned to June 12.

Wednesday evening, June 12. Regular meeting; the President in the chair. Study of birds of the season. This being the last meeting before the summer vacation, members were urgently requested to keep a list of birds seen during the three following months and make a full report at the first meeting in the fall.

A matter of special interest was the report by Mrs. Varick of

the discovery on Bedford plains of a colony of Prairie Warblers (*Dendroica discolor*), a species never before reported as breeding in this section or north of Massachusetts. The colony was discovered by Mrs. Varick and Dr. W. R. Varick, who had already become acquainted with the species at Martha's Vineyard. On the 11th Mr. and Mrs. Batchelder accompanied them to the locality, and entirely satisfactory observations of both plumage and song were accomplished. Since the only person licensed to shoot birds for specimens lived at a distance, his services were not available on this occasion, and shot-gun identification had to be postponed.

Adjourned to the call of the President.

Monday evening, October 7. At the call of the President, a meeting of the Executive Committee was held to arrange a program for the coming season. It was voted to place each meeting in charge of some member as leader, who should present the subject assigned him in a paper or talk, and with whatever illustrations might be available.

It was also voted that hereafter the meetings of the Section be held on the second and fourth Tuesdays in each month. It was voted to call the first meeting of the season for October 22.

Adjourned to the call of the President.

Tuesday evening, October 22. Regular meeting; the President in the chair.

An outline of the work was given by Mr. Cass, and subjects were assigned.

Adjourned to November 12.

Tuesday evening, November 12. Regular meeting; the President in the chair.

The lecture by H. T. Bailey, in the Chandler course, occurring this evening, it was voted to adjourn.

Adjourned to November 26.

Tuesday evening, November 26. Regular meeting; the President in the chair.

As leader for the evening, Mr. Cass presented the subject of

the Anatidæ, describing and defining the three groups, mergansers, river ducks and sea ducks, with reference to coloration, habits, food, flight and nests. Miss May Davis contributed notes on the sea ducks, and Mr. Fogg on the river ducks.

Adjourned to December 10.

Tuesday evening, December 10. Regular meeting; the President in the chair.

Miss Theodora Richardson, leader for the evening, read a paper on "Birds' Nests of This Locality." This was followed by a study of nests in the Institute collection, and by the exhibition of the lantern slides of nests, loaned by the Audubon Society.

Adjourned to December 11.

Wednesday evening, December 11. In accordance with the By-Laws of Section D, the annual meeting was held this evening; the President in the chair.

A nominating committee, appointed by the President to bring in a list of names for officers for the ensuing year, submitted the following list:

*President*—Mrs. F. W. Batchelder.

*Vice President*—Mrs. J. C. Bickford.

*Secretary*—Miss May W. Davis.

*Executive Committee*—Mr. Edward H. Fogg, Miss Theodora Richardson, Dr. W. R. Varick.

It was voted to adopt the report of the committee, and the Secretary was authorized to cast one ballot for the foregoing list of names. This having been done, the above-named persons were declared duly elected as officers of Section D for the year 1902.

As the date of the next meeting would fall on Christmas eve, it was voted to adjourn to the second Tuesday in January, 1902.

Adjourned to January 14, 1902.



ADDITIONS  
TO THE  
PRELIMINARY LIST OF BIRDS.

COMPILED BY FREDERICK W. BATCHELDER.

- 343. *Buteo latissimus* (Wils.)**  
BROAD-WINGED HAWK.  
Not common transient visitant.
- 366. *Asio wilsonianus* (Less.)**  
AMERICAN LONG-EARED OWL.  
Not common permanent resident.
- 368. *Syrnium nebulosum* (Forst.)**  
BARRED OWL.  
Not common permanent resident.
- 370. *Scotiaptex cinereum* (Gmel.)**  
GREAT GRAY OWL.  
Very rare winter visitant. A specimen shot several years ago in New Boston is now in the possession of Mr. Charles L. Richardson, of Manchester.
- 375. *Bubo virginianus* (Gmel.)**  
GREAT HORNED OWL.  
Not common permanent resident.
- 376. *Nyctea nyctea* (Linn.)**  
SNOWY OWL.  
Rare winter visitant.
- 466a. *Empidonax Traillii* (Aud.)**  
TRAILL'S FLYCATCHER.  
Rare transient visitor. Observed at Manchester May 11 and 16, 1901, by Mrs. M. H. Varick and Dr. W. R. Varick.
- 673. *Dendroica discolor* (Vieill.)**  
PRAIRIE WARBLER.  
Rare summer resident. A colony of these warblers was dis-

covered on the 2nd day of June, 1901, on Bedford plains; about two miles south of Manchester, by Mrs. M. H. Varick and Dr. W. R. Varick. On the 11th, other members of the Institute visited the locality and perfectly satisfactory observations were made at short range. A few days later another colony was discovered on the plains near Rock Rimmon, in West Manchester, and observations of both colonies were had subsequently throughout the month. As several of the observers had already become acquainted with the species in southern Massachusetts the compiler feels safe in adding the name to the local list, although the absence of the only person licensed to shoot for scientific purposes caused the postponement of shot gun identification. About a dozen birds were seen at the Bedford station and nearly as many at that in Manchester. The birds were in song and in perfectly characteristic plumage.

**722. *Troglodytes hiemalis* (Vieill.)**

WINTER WREN.

Not common transient visitant. Observed at Manchester, Oct. 20, 1901.

**757. *Hylocichla aliciae* (Baird.)**

GRAY-CHEEKED THRUSH.

Not common transient visitant, with difficulty distinguished in life from *H. ustulata swainsonii* (Cab.) Exceptionally favorable observations were made May 12, 1901, and several days following.

# NESTS.

BY THEODORA RICHARDSON.

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The houses of our friends, if built by them, reflect their individuality, and though all are built of wood, stone or brick in varying proportions, a wondrous variety is produced.

Our bird neighbors, using twigs, rootlets, hair, string, bark, plant-down, mud (and in some cases unusual materials, depending upon environment), show their individuality in their selections, combinations and locations. As varied as the materials are the locations; in trees, in tree-trunks, under eaves, barns, sheds or bridges; in banks, in low shrubs, and on the ground; each family instinctively choosing that kind of site which has been the established custom of preceding generations. The characteristic nest-building of different families, and different species in a family, is no less wonderful than the selection of location.

Returning from a fall outing, two interesting bird trophies were brought home by friends, and were duly brought out for my inspection when I arrived to hear of their travels. They were the vireo's handiwork, but who shall say which, the Red-eyed, the Yellow-throated, or the White-eyed? All are made of similar material, and are pensile, being suspended from a forked branch. The Red-eyed vireo is most frequently found about here. Its nest is composed largely of strips of bark, with an interlining of finer strips, so closely resembling the pine needles as to easily deceive one; but what attracts the casual observer is the artistic outer covering of strips of bark from the white birch, and some of those tough, white spider-egg-silk-cases found on old boards. William Hamilton Gibson tells us that fragments of hornets' nests, as well as newspaper scraps, are favorite materials, and he once found a novelty, even for a vireo, "a nest entirely composed of snake-skins."

I once found the nest of a Red-eyed vireo hardly three feet from the ground, close by a path not much frequented until

July, a time later than the vireo's nesting-time. The faithful mother remained motionless upon her dainty nest, while each detail of her feathered covering was noted inch by inch; the beautiful rich olive-green of the upper parts, with the conspicuous white eye-line bordered with black, and the contrasting pure white of the breast; but the greatest delight of all was to actually see the red eye.

Drawn to the thicket by the sweet song, with which he regales you at early morn and dewy eve, you find the catbird, in the haunt long loved by the family, for generations perhaps. Here, in seclusion and safety, the nest is discovered in a large blueberry bush, whose base is submerged in the waters of the swamp. Once discovered, peace will not be restored until you withdraw and remain at a discreet distance, there to listen if you will. But an inborn curiosity "to see what birds' nests are made of," as Thoreau has said, prompts you, in time, to secure that nest. You note at once the strong contrast in construction between this nest and that of the vireo; its foundation of twigs 6 or 8 inches in length is so loose; above this are strips of grapevine bark, and the interlining is of water-washed rootlets from brook or lakeside.

But another member of the catbird family built her nest with quite an attempt at the picturesque, and who can say but that she made an attempt to initiate her fledglings in the rudiments of art? For in clear type we find the following:

HOLD THE CUBE OUT—

WHICH FACE DO YOU SEE?

PLACE THE SPHERE ON THE—

Then beside these valuable instructions we find the accompanying, "Use Robinson and Thorndike's Cough Drops." With a temple of learning and a well-known hospital within earshot of the nest's location, 'tis easy to see that this bird made good use of its opportunities.

Frequent passing through the orchard had failed to locate the whereabouts of a kingbird's nest, until one morning three overgrown members of the family were seen perched near it. There it was, at the top of the apple-tree, in plain sight. The wonder

was that we had not seen it before. It was firmly saddled onto the branch at the forking near the end of a bough, and though composed of few materials, twine, plant-down, rootlets, with finer rootlets for interlining, it seemed made wholly for use, with no thought of beauty.

In a much-loved wood, where the veery sings its vesper from the tallest pines, their nests have been formed on the ground, but this year, in later May, we flushed a veery from her nest on a brush-pile. There it was, in full view, only shielded from the rains of heaven and the scorching sun by one immense brake. The nest was composed of leaves and bark. Upon the lining of the rootlets reposed three eggs of greenish blue. Could even an experienced eye decide whether these were the eggs of the veery, or its cousin the robin, or the wood thrush, when the bird was not seen in the nest?

May 30 was a raw, lowery, damp day, but despite the weather there were three wood thrushes calling back and forth, and at times all uniting in a chorus more uplifting than that of human voices. The hill-top woods find them there each year, and with patient search we found the nest, on which was sitting the beautiful female with clear spotted breast, quiet brown eye and long, trim tail. But the home solitude being invaded, she left her nest. It was placed about nine feet high, in a sapling pine, at the junction of the clustering branches; it was largely composed of leaves, with twigs and rootlets interwoven. Amid an enchanting woodland setting, where grew a profusion of the flowering moosewood, mingled with the hemlock and young, tender green of the tall chestnut trees, with here and there a thorn tree in full bloom, it seemed a more fitting spot to find our wood thrush located. A second nest was in this æsthetic spot, and was built in a curious fashion on the crossing of two witch-hazel boughs. Not an egg was found in either of these nests, showing that our veery had nested earlier in this instance.

Our next find was a family of five half-fledged bluebirds in the decayed trunk of an old appletree. They reposed on a soft lining of pine needles. The parent birds refused to feed the

young while we were near, but hovered around, reiterating their soft warble.

When happy chance gives one leisure in nesting time, what family secrets he is let into, in the bird world. Sitting patiently under a fragrant pine, and listening to the bird notes in all directions, and one near, that of the oven-bird, or golden-crowned thrush (as he is sometimes called), we saw his mate fly past repeatedly with food for the young. Knowing that it would be a rare thing to find the fairy oven, we made diligent search, but without success. Returning the next day, by accident we so nearly stepped on the nest that the overgrown babies made good their escape. In so doing, they revealed the nest, composed of a few chestnut leaves, but mainly of pine needles; it was at the base of a pitch pine. Having ruthlessly disturbed their peace, we tried to gather the frightened brood, but it was of no use; we desisted, and they disappeared as completely as do young partridges, when fairly grown, hidden by their protective coloring among the dry leaves.

'Twas here, in this same wood, that we were shown the leafy nest of Madam Partridge, the ruffed grouse. It held a dozen pure white eggs, and some days later we were there when two or three downy babies had just hatched and were standing without the nest. They were so tiny, and wobbly on their little yellow legs, that they cuddled in our hands, too young to be afraid. Not so the brave little mother. Fear was in her eye, so we withdrew, leaving her still sitting. One of the most difficult nests to secure and keep in shape was that of the Black-billed Cuckoo, The typical apple twig though sometimes straight, is covered with lichens and knotty protuberances. The nest was made almost entirely of such twigs, with a few mosses, and clusters of apple-blossoms for lining. Did the bird gather the latter for fragrance and decoration? The tender petals with surrounding soft, green, young leaves were at least fragrant and beautiful for a day. Each year, one or more pairs of these beautiful, shy birds, have been seen near the Reservoir. It is hoped that a fresh specimen of their nest building may be added to our collection.

Many Institute observers think that the Prairie Warbler un-

doubtedly in the scrub-pine growth on the sandy Bedford Plain and in similar country just west of Rock Rimmon. Should they return this coming summer it remains for enthusiastic bird-lovers to bring to light one of their nests.

Burroughs tells us that in Georgia "the Baltimore oriole places its nest on the north side of a tree, in the middle and eastern states it fixes it on the south and east side, and makes it much thicker and warmer." He further says, "I have seen the nest from the south that had some kind of coarse reed or sedge woven in it, giving it an open-work appearance, like a basket." We are all familiar with the nest which is sometimes brought low by the winter winds. Then is revealed the wonderful weaving about the strong, supple elm twigs, for it loves the elm the best. Although the walls are thin, they are firm. Lowell gives us the following gem :

High o'er the loud and dusty road  
The soft, gray cup in safety swings,  
To brim, ere August with its load  
Of downy breasts and throbbing wings.  
O'er which the friendly elm tree heaves  
An emerald roof with sculptured eaves.

\* \* \* \* \*

Oh happy life to soar and sway  
Above the life by mortals led.  
Singing the merry months away  
Master, not slave, of daily bread,  
And when the Autumn comes to flee  
Wherever sunshine beckons thee!"

While living in summer woods, I have often seen the brilliantly colored redstart and his little mate together feed their fluffy offspring, whose green coats so strongly resemble that of their maternal parent. But patient search has never yet disclosed their dainty home. It remained for a kind friend to give me the pleasure of possession of one of these nests. This one was placed in the crotch of four branches, giving it a conical shape. Its outer walls are almost entirely made of strips from plant stalks, with here and there a bit of cotton, paper, or twine; the whole becoming thoroughly matted by exposure. The inside is of soft hair.

Yet quite different in shape and combination is the nest of its cousin, the yellow warbler, or summer yellow-bird, commonly called. This is made of plant down inside and out, with strong hair and fine grass to fasten it firmly into the crotch of the blueberry bush. From its location, near the swamp, we saw the bird daily, darting in and out. William Hamilton Gibson relates an interesting account of the manner in which this tiny little warbler outwitted a cow bunting, who persistently added unlawful egg contributions to her nest. A specimen of nest which he found afforded quite a contrast to the usual size, its depth being about five inches. Examination proved the summit to be a distinct division, beneath which was a perfect nest containing an egg—a token of the cow-bird; then, the lower section seeming more bulky than the normal nest, further investigation revealed a third division, with another spotted egg within. “A three-storied nest! A nest full of stories, certainly!”

On warm days when robins dot the green southern slopes of pastures and fields, the phoebe carols its decisive, persuasive note. The proximity of this sober-colored bird to a corn-crib led us to search for bird-treasures beneath its rafters, where, unexposed to rigorous storms, reposed three mossy phoebe's nests, lined with mud, indicating as many seasons in this favored location. A robin's nest also kept them company. A recent Institute acquisition is quite as wonderful as any told of by Burroughs or others. A phoebe's nest built on a clothes-line, its mossy green cup so fulfilling the laws of physics that it must have balanced in a vertical position when the bird alighted on its rim; at other times, when she was away, it tipped slightly. If the bird had not made this wise provision, her eggs would have been easily spilled.

Accompanying this gift was the moss-covered cup of the humming-bird, capable of holding only two diminutive birds of bumble-bee size. It is said that, realizing it was being watched, the parent bird deserted the nearly completed nest.

This year, when it was time for the barn swallows to return to one of their favorite nesting places, the spot was visited, but not a vestige of last year's nests remained. Were they dis-



### **NEST OF PHOEBE.**

Built on clothesline. Collected by J. O. Harriman. Photographed by E. H. Fogg.  
See p. 80.



lodged by weather, or was it the work of those English sparrows, who come daily to the barn-yard to pilfer the hens' grain?

But soon the eaves swallows with their white foreheads, and the long forked tailed barn swallows returned and were seen gathering the little pellets of mud in the road for their homes beneath the eaves. Each day's work was shown by the addition of dark, fresh mud, that of the previous day having dried.

Long before there were so many bird-lovers in country towns, a good old farmer added a narrow strip of boards, a few inches below the eaves, on the south side of the barn, to aid the eave swallows in building. The shelf was nearly filled by their nests, of which there were nearly a hundred. Adapting the construction to the location, the space between the shelf and the eaves was entirely plastered, leaving but a round opening from which the alert bird viewed the world. The usual structure of the barn or eave swallow is a simple, pocket-shaped affair plastered to the side of the barn or onto the rafter. In childhood days the occupants of these nests were watched with wonder and admiration. How beautiful their plumage! And what power of flight! The acme of grace and poetry of motion. For many years this state of affairs existed, the birds reoccupying, each spring, the nests which needed but slight renovation.

The same man, with hospitable intentions erected a large and imposing bird house in his garden. A flock of purple martins soon took up their residence, and each succeeding year finds them there, in full numbers.

Whether there was a feud similar to that of the house of Montague, and of Capulet, I cannot say, but the belligerent martins made war on their relatives, the swallows, and demolished so many of the nests, that a greater part of the swallow colony left the premises, never to return.

You will perhaps recall "Silver Spot," so called on account of the round spot of white near his beak? He was the wise old crow of whom Thompson-Seton tells. For years in a somewhat isolated pine, a crow's nest had reposed near the summit of the tree. The gunners and passers-by had long thought it un-

used, but one day, old "Silver Spot" was discovered brooding, while his mate was away. These wise birds had apparently in no wise changed the weather-beaten structure and so it is, some birds appropriate last year's nests with or without repair, as the swallow, wren, and others. Some build new each season, but rear more than one brood, in the same nest during the season, as does the phœbe. Some rebuild each year. These include the greatest number. Often birds make no nests of their own, but use abandoned nests. Other birds build no nest, their eggs being deposited on the rock or sand.

Though denuded trees and bushes reveal many nesting sites, yet the most satisfying nest specimen is taken as soon as it is apparent that it is no longer needed. At this season untrodden and inaccessible swampy grounds may be searched for the nests of the red-winged blackbird. It was in such a spot, where thick-clustering water bushes, tall reeds and cat-tails grew, that we found a grassy nest, inside of which were the remnants of an egg-shell, plainly indicating the family.

Burroughs has said that "Though generally regular in their habits and instincts, yet the birds seem as whimsical and capricious as superior beings. One is not safe, for instance, in making any absolute assertions as to their place or mode of building. Ground builders often get up into a bush, and tree builders sometimes get upon the ground, or into a tussock of grass. The song sparrow, which is a ground-builder, has been known to build in the knot-hole of a rail fence, and a chimney swallow once got tired of soot, and fastened its nest on the rafter of a hay barn."

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MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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**SECTION E.**

**FINE ARTS.**

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**Officers for 1901.**

WILLIAM H. HUSE, *President.*

WILLIS B. KENDALL, *Treasurer.*

WILLIAM E. BUCK, *Auditor.*

EVA F. TUSON, *Clerk.*

**DIRECTORS.**

HENRY W. HERRICK,

J. BRODIE SMITH,

NORWIN S. BEAN,

WILLIAM K. ROBBINS,

W. R. CALL,

WILLIAM E. BURBANK,

WILLIAM E. BUCK,

MRS. JOHN B. VARICK.

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## SECTION E.

# FINE ARTS.

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During the winter Mr. William E. Burbank continued his Thursday evening class in drawing from the antique. On Friday evenings and Saturday forenoons Mrs. Melusina H. Varick's classes kept up their work in wood carving with unabated interest. Mrs. Maud Briggs Knowlton's Saturday evening class in wash drawing from still life showed no diminution of zeal. To all these instructors the Institute owes much. At the close of the season, in June, an exhibition of the work done by the classes was held in the rooms, and attracted many visitors who were enthusiastic over the work of the Art Section. All the classes resumed work in the fall, although upon Mrs. Varick's inability to be present with the work of the wood carving class, the direction of the work was placed in the hands of Mr. Ed R. Robinson and Miss Annie F. Abbott.

Rev. Charles J. Staples completed his course of lectures on English Literature. His subjects were as follows: January 15, William M. Thackeray; February 11, William Wordsworth; March 12, Robert Browning.

In the fall Mr. Staples began the following course of "Readings in American Literature—Studies in Spirit and Style."

I. Benjamin Franklin. 1706-1790. December 4—Poor Richard's Almanac and the Autobiography.

II. James Fenimore Cooper. 1784-1851. December 18—Deerslayer and the Last of the Mohicans.

III. Washington Irving. 1783-1859. January 1—The Sketch Book.

IV. Edgar A. Poe. 1811-1849. January 15—Tales and Poems.

V. Nathaniel Hawthorne. 1804-1864. February 6—The Marble Faun.

VI. Theodore Winthrop. 1828-1861. March 6—Cecil Dreeme.

VII. James Russell Lowell. 1819-1891. March 10—Essays. Among My Books.

VIII. R. W. Emerson. 1803-1882. April 16—Essays. April 30—Poems.

At the annual meeting held in the rooms October 8, 1901, the following officers were elected :

*President*—Jennie Young,

*Treasurer*—Willis B. Kendall,

*Auditor*—Norwin S. Bean,

*Clerk*—Eva F. Tuson,

*Directors*—N. S. Bean, W. R. Call, J. Brodie Smith, W. K. Robbins, W. E. Burbank, Mrs. John B. Varick, Mrs. Lucinda L. Farmer, W. H. Huse.

## THE EMELINE R. BALCH BEQUEST.

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On November 5, the publication of the will of the late Mrs. Emeline R. Balch, who died on November 1, announced the following provisions, of interest to all members of the Institute :

"I give, bequeath and devise, on account of the interest that my late husband entertained in the advancement of art, my lot of land with the dwelling house thereon, where I now reside, situated in said Manchester, bounded and described as follows, to wit: Westerly on Elm street, there measuring 120 feet; southerly on lot 2025, there measuring 120 feet; easterly on a twenty-foot passageway, there measuring 120 feet, and northerly on North street, there measuring 120 feet, to the Manchester Institute of Arts and Sciences, in fee, for the benefit of the Art Section of said Institute.

I also give and bequeath to said Manchester Institute of Arts and Sciences, for the benefit of the Art Section of said Institute, my portrait of my late husband, my painting of *Christ, St. John and the Lamb*, my painting of the Appian Way, my painting *Aurora* by Guido Reni, my mosaic picture of the Castle of St. Angelo, my painting *Vestal Virgin*, my painting *Tarantella*, my two Sevres banquet lamps, my pink glass toilet set, my twelve red glass plates made at Sevres, my two Napoleon plates marked with "N" and a crown, my twelve French portrait plates, my Cantonese silver tea service, my gilt sofa and chair upholstered with Lyons velvet, my bronze statue *Star of the Morning*, with the pedestal on which it stands, my Sedan chair cabinet and its contents, my two stationary sideboards now in my dining room and their contents, and all the chandeliers, gas and electric fixtures in said dwelling house at my decease; and I direct that the several bequests above named from my personal estate shall be appropriately placed and used in the Art Building of said Institute; and I also give and bequeath to said Manchester Institute of Arts and Sciences the sum of \$50,000 for the benefit of the Art Section of said Institute."



# Edgar Allan Poe----A Study in American Literature.

BY REV. CHARLES J. STAPLES.

Delivered at a Meeting of Section E of the Manchester Institute of Arts and Sciences, January 18, 1902.

Poe's literary work never met a more intelligent and enthusiastic appreciation than it is meeting today. Interest in his writings, both here and abroad, has been steadily growing; he has challenged the attention of the best students of English literature everywhere, and like some isolated hill, which, as you recede from it, shoots up above the plain, his position in the world of letters becomes more commanding as the years spin away. To Edgar Allan Poe that indispensable, undefinable and misused word, genius, undoubtedly applies. The mark of that genius is not graciousness nor wide understanding and sympathy with human life, but power,—power to hold the reader's attention, to compel his thought, to arouse his feeling, and even at times to gripe the very soul.

In approaching works so strange, so unreal, so grotesque and yet so powerful, the ordinary methods and measures of criticism do not seem to avail. This is truer of the tales than the poems. But both are peculiarly and sharply individual. Poe stands, as a maker of literature, in a class by himself. It is, perhaps, to be hoped that he will never have an imitator or follower, for to imitate him were to spoil him. A second Edgar Poe would take away something of his fascination. There are none with

whom we may justly liken him in the whole range of English literature, though the names of Mrs. Radcliffe and of Gregory Lewis suggest themselves as distant relatives. Those who have been nearest to him in spirit may perhaps be found in Germany. In Poe at his best, one thinks of Wilhelm Hauff, Heinrich Heine, of the witches on the Brocken, or the grotesqueness, without the weird symbolism, of the Second Part of Faust.

But a better and more truly suggestive comparison, it seems to me, might be discovered in another realm of art, in that wild Hungarian music which seems to open a world of the unexpected and the fantastic, the uncanny, the weird and the mysterious.

This is not to claim for Poe a genius of the highest order or the highest success, but it is genius. Compared with Hawthorne, whose impulses lay in something of the same direction, he failed. The statement is often made that genius and insanity are akin, both being abnormally sensitive, irritable and neurotic. We find a passage in Poe's own writing which touches upon this idea. The tale of "Eleonora" opens thus :

"I am come of a race noted for vigor of fancy and ardor of passion. Men have called me mad ; but the question is not yet settled whether, madness is or is not the loftiest intelligence—whether much that is glorious—whether all that is profound does not spring from disease of thought—from moods of mind exalted at the expense of the general intellect. They who dream by day are cognizant of many things which escape those who dream only by night. In their grey visions they obtain glimpses of eternity, and thrill in waking, to find they have been upon the verge of the great secret."

Fundamentally, such a statement, I believe, is false. The great genius is calm, self-poised. The depths of human passion are not unknown to him ; indeed, he penetrates them more deeply than the common man. But the deepest passion has nothing in it effervescent and frothy. Genius is strongly sane and wholesome in its highest form of expression. But, since genius can only exist in conjunction with a fine and delicate nervous organization, it runs a special danger of insanity, and quickly, easily, momentarily, passes the dividing line. Men of this kind are moody, ill-balanced, undisciplined and un-

controlled. The spirit is imperfectly master of the mind, of itself. It is fretted by an inability to find full and perfect means of expression. Like high-mettled horses, genius may be swiftly ruined. Its temptations are great, its pride and poverty like whips of scorpions, its sufferings keen to the point of hysterics and of wildness. If the will is weak and circumstances untoward, if the childhood and youth have been over-stimulated and unhealthy, there will be frequent lapses into what is morbid and unmanly.

So it was with Poe; and in the literary consideration of such an author we have the strongest desire to separate the writings from the man, to judge the writings in themselves, forgetting the biography. A few of Poe's productions are almost matchless, and instinctively we feel that it would be better to leave the man out of the account. What has a man's life and fortune to do, we are tempted to say, with his writing? But it is impossible; the man, as always, belongs with his works and his works to the man. At the best, his was a pitiful and disagreeable story; it was an unworthy and unmanly life. Poe was sinned against, no doubt. He inherited an excitable and unquiet temperament, and received no adequate training or government as a child. Early in life he was left an orphan and by his adopted parents used as a plaything and spoiled. At home and in college he gained no just ideas of life, or standards of right conduct. Add to this the fact that in his later career Poe continually forced himself to spells of intense cerebral excitement in the labor of composition which were followed by an irritability and exhaustion that many fail to understand. The knowledge he acquired, or rather picked up at random, was scrappy, ill-assorted and inaccurate. Hardly a detail of his life has been spared as a subject of bitter controversy and of the most diverse interpretations, exalting him to heaven or damning him to hell. If anywhere, his actions toward his child-wife seem to show the best of which he was capable, a romantic affection, an unselfish feeling, a tender if exaggerated sympathy.

These things are to be said for him. Yet the verdict must be that he was completely and utterly self-centered, idle in youth,

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dissipated, sordid, vain, unprincipled and affected. It is not unjust to say that truth never seemed to him a necessary element of character. From early life he treated truth lightly, and sometimes took extraordinary pains to avoid it. Whether in the last years this trait was not intensified by the use of opium is open to question, but throughout he was a *poseur*, assuming attitudes and convictions and virtues, with the ease and freedom of an actor. Perhaps he was hardly conscious how radically hollow and insincere it all was and how much it was the playing of a part. He became a total wreck at last.

We have no right to pass a moral judgment on these matters in a literary discussion. But they were not without influence upon his writing, and his work is not intelligible without reference to the kind of man he was. From such a character the greatest literature is impossible. In three of the requisites which such a literature requires he was wanting :

(a) His themes, the subjects he chooses are morbid and unwholesome. Of course this does not mean that they are immoral. On the contrary, both in choice and in treatment Poe is, so far as I have read, entirely free from any slightest taint of impurity. But his interest is pathological; it is attracted to what verges on disease, spiritual and mental disease in human nature. His subjects are fascinating to him because they border on the horrible; because they are extreme, rare and unusual; and this *penchant* grew upon him. Now the monstrous and the morbid are not illegitimate as subjects in literature. In fact there is a distinct fascination in them. But as we all realize it is a dangerous fascination. It is dangerous both for the author and the reader. It is an exercise of the imagination that grows by what it feeds on; which is like a narcotic, inducing the artificial necessity of larger and ever larger doses. It gradually and insidiously distorts the spiritual point of view. The healthy human being cannot, ought not to live in such an atmosphere, nor would it promote any rational end if he did. In medicine, pathology has a distinct and helpful place. The physician studies disease that he may understand it and effect a cure. In literature it can have no such end and office. Here

it exists for the sake of the sensation that it causes. It furnishes excitement, makes an impression, rouses and stirs the *blase* and sluggish mind. This may possibly be of temporary use; it may on rare occasions be justified. But it is company in which a man cannot keep his health and poise of soul or body.

Poe found that his power told best in this direction, and the temptation was great to strain it to the utmost. Hardly can you find a thoroughly healthy subject in the whole range of his poems or his tales. He took possession of the borderland between sanity and insanity, as his province, and his congenial themes are close to death and dissolution. He excels in the description of those conditions of mind and feeling in which the gruesome and grisly appear vivid and real. We seem sometimes in his writings to be watching the human spirit on the verge of attenuation and disappearance. Perhaps it does us no harm once in a while to feel the sensation of horror, the symptoms of a scare. But it must be taken in limited doses. It is increasingly difficult to make us creep in these days, but so far as the imagination can do it Poe almost and sometimes quite succeeds in doing it. The "Masque of the Red Death," the "Fall of the House of Usher" and "Ligeia" may be mentioned as typical of this success, though the illusion depends, of course, on the imagination of the reader quite as much as on the author. But this success is not vital or vitalizing. It has no power to stir and stimulate the heart of human nature and create a larger life. It is somber horror, vain supernaturalism, a mere thrill of the nerves. Or, to put the same thought in another way, Poe lived and deliberately sought to live in the night-side of nature and humanity. He tried to work that vein to the utmost it would bear. There is a night-side to nature and life, one of its mysteries surpassing knowledge. There is a peculiar spell in watching a great fire. It is the spectacle of unbridled energy, the flaming horror of destructive force; but its end is ashes. Nothing comes of it. On the part of humanity there is the parallel exhibition of passion, fierce fear, sin, crime and remorse. There is an energy of gloom, of brooding

calamity like the overhanging pall of black smoke that precedes the bursting volcano of fire. In the representation of this Poe was a master-artist. He had caught, perhaps, some of this secret from Lord Byron. He surpassed him in the creation of monstrous souls and monstrous situations, veritable "dragons of the slime," of which the tale of "William Wilson" is an instance. But from the night-side of man and nature only a paralyzing influence can ever flow. Its ultimate end is ashes.

(b) In close connection with this morbidness of theme is Poe's lack of breadth. He was nothing if not intense. He burned himself out in an exciting and nervous concentration upon a very limited field of imaginative literature. That field he has pretty clearly described in the title he gave to one of his first collections—"Tales of the Grotesque and Arabesque," and the poems are much of the same sort, together with an undeniable ear for the music of words. With characteristic perverseness he believed himself equally great in many varieties of composition, but he was utterly mistaken. His was an etching point rather than a generous broad hand. He worked with thoroughness and in miniature; all his compositions are short. His imagination was limited to very narrow and definite lines. He had no conception of character, but only of situations and conditions. This is why his humor, when he attempts it, is excruciating and far fetched. As in the "Gold Bug," for instance:

"Stay here tonight, and I will send Jup down for it at sunrise. It is the loveliest thing in creation! What?—sunrise? Nonsense! no! the bug. It is of a brilliant gold color. \* \* \* The antennæ are—"

"Dey ain't no tin in it, Massa Will, I keep a-tellin' on you," here interrupted Jupiter; "de bug is a goole bug, solid ebery bit of him, inside and all, sep him wing—neber feel half so hebby a bug in my life."

He was a master of climax, but not of the drama in the large sense. He knew the glooms and the fierceness of the human soul, its shudders and its fearsome dreams, but not its sunniness, its hopes, its radiance. He had the most superficial, ba-

byish conception of woman; he had an eye for beauty, but it was beauty of form, not of spirit and character.

(c) Still more striking, the more deeply Poe's work is examined, is his artificiality. Perhaps he was as self-conscious a great writer as ever lived. And that is saying a good deal, for most of them are abnormally self-conscious and subjective. He is the very opposite of hearty, sociable old Sir Walter Scott. This is not apparent at once. The first impression made by Poe's writings is one of power, and the power of genius is always objective; the man sinks himself in the seriousness and reality of his work. That seems true at first sight in regard to Edgar Poe. But as the original impression passes, you grow more aware of the artifice which lies behind. He studies with wonderful patience the art of producing effects, a histrionic effect. It seems to be spontaneous, to be real. There is an air of seriousness, a freedom from exaggeration, a calmness, a superb balance about his narrative which creates that illusion. But it is an illusion. Admitted behind the scenes, you discover how the wires were pulled and the plots arranged. His description, for example, of the method by which "The Raven" was deliberately manufactured—manufactured is precisely the word—is one of the most curious and disillusionizing passages in literature. It may be found in *Littell's Living Age*, Vol. cXLVI, p. 696. Whether this passage was written partly in jest or wholly in earnest, it throws a good deal of light upon Poe's qualities as a writer. He had extreme cleverness and great natural gifts of expression. He was a good, even an extraordinary workman. But the parts are put together by a kind of contrivance, not by an original act of creative thought. The end and result are first conceived and then all sorts of artifices are invented to attain that result. Whereas great literature rather springs from the initial impulse of an idea that demands utterance, and the form that utterance will take cannot be foreseen. It bears about the same relation to a genuine literary inspiration that the watch discovered on a Patagonian desert, in Paley's unfortunate illustration of *Natural Theology*, bears to the living world of divine creation. The method Poe pur-

sued gives you the uneasy sense that he is chuckling at you while he has you under his spell. He is deeply interested in his work, but never quite in earnest. Poe did not serve truth. He had no thoughts to convey. His writing represents nothing but his own skill. His art was for its own sake. He was a clever cabinet-maker in words.

Where then is the secret of his influence, his undoubted power, the spell he exercises upon the mind? We find it in a rare combination of cool intellectual analysis with a strong sensuous imagination.

This analytic power is exceedingly keen even when shrouded in the mystical vagueness which he loved. This is the element by which he made the improbable and the impossible seem actual. The construction of his tales and many of his poems is superb. It is the work of a very acute intellect arranging in advance the ingenious details of a scheme. His mind, that is, by the power of analysis foresaw and reasoned out all the elements of a problem and then fitted them together so accurately as to leave the jointures almost invisible. His mind was of the order which is required by the inventor of puzzles. His tales of mystery and of the solution of mysteries are a witness of this intense analytical power. Another evidence is found in the astonishing fact, that, in a criticism upon some of the first numbers of Dickens' *Barnaby Rudge*, then issuing in parts, he drew a clear outline of the plot Dickens had then in mind, and as yet unwritten. The minutest details, the values of the separate words are weighed deliberately and fitted into the structure of the composition as delicately and purposively as in the cabinet maker's art, or as in some specimen of marquetry. In this respect they bear close study. Few minds of high order have been able to stand aloof from their creations in this fashion and reason out the mechanism that produces the desired effect. But Poe coolly devised, it would seem, the joints and wires that would move his figures and display them to the best advantage in the eyes of the spectators. It was entirely in accord with this power of keen analysis that he became absorbed in the study of cryptograms and maintained in public that no cryptogram could

be invented which an attentive intellect could not solve. It is said that for a while he was flooded with secret ciphers from all parts of the country, to which he devoted so much time as to imperil his proper business. The cipher which he introduces into the story of "The Gold Bug" is not the least effective element in that famous piece of cleverness.

But united with this clear and cold intellect is a marvelous vigor and richness of imagination. Perhaps fancy is the better term, for it was not a great imagination, but, as we have seen, an imagination narrowly limited and incapable of seeing or representing life as a whole. Even this luxuriant fancy of Poe's gives, upon a second reading, the impression of a *tour de force*; it exhibits a carefully planned attempt to work up a stage effect. Poe was always aware of what he was doing. He never yielded himself wholly to a thought or an emotion. He was not spontaneous, even in his gorgeous dreams. Whether produced by the use of opium or not, his imagination was opium-drugged. It was not in any way sensual, but it was sensuous. He rioted in "color." He loved the highly decorated, though his abundance of color, is usually held in check by an artist's perception of "color values."

"Years dragged themselves along heavily, and still I dwelt in the Valley of the Many-Coloured Grass; but a second change had come upon all things. The star-shaped flowers shrank into the stems of the trees, and appeared no more. The tints of the green carpet faded; and, one by one, the ruby-red asphodels withered away; and there sprang up, in place of them, ten by ten, dark, eye-like violets, that writhed uneasily and were ever encumbered with dew. And life departed from our paths; for the tall flamingo flaunted no longer his scarlet plumage before us, but flew sadly from the vale into the hills, with all the gay, glowing birds that had arrived in his company. And the golden and silver fish swam down through the gorge at the lower end of our domain, and bedecked the sweet river never again. And the lulling melody that had been softer than the wind-harp of Æolus, and more divine than all save the voice of Eleonora, it died little by little away, in murmurs growing lower and lower, until the stream returned, at length, utterly into the solemnity of its original silence. And then, lastly, the voluminous cloud uprose, and, abandoning the tops of the mountains to the

dimness of old, fell back into the regions of Hesper, and took away all its manifold golden and gorgeous glories from the Valley of the Many-Coloured Grass."

The glow, the splendid, dreamy, simulated character of his landscapes has never been equalled or approached. The supernatural quiver, the lurid quality of his descriptions is sometimes terrific and unearthly.

The Lady Madeline of Usher has been buried alive in a vault of the castle. Her nervously diseased brother fears it, but does nothing. He speaks:

"Is she not hurrying to upbraid me for my haste? Have I not heard her footstep on the stair? Do I not distinguish that heavy and horrible beating of her heart? Madman!" Here he sprang furiously to his feet, and shrieked out his syllables, as if in the effort he were giving up his soul, "*Madman! I tell you that she now stands without the door!*"

As if in the superhuman energy of his utterance there had been found the potency of a spell, the huge, antique panels to which the speaker pointed threw slowly back, upon the instant, their ponderous and ebony jaws. It was the work of the rushing gust; but then, without those doors, there *did* stand the lofty and enshrouded figure of the lady Madeline of Usher. \* \* \* \*

From that chamber and from that mansion I fled aghast. The storm was still abroad in all its wrath as I found myself crossing the old causeway. Suddenly there shot along the path a wild light, and I turned to see whence a gleam so unusual could have issued, for the vast house and its shadows were alone behind me. The radiance was that of the full, setting, and blood-red moon, which now shone vividly through that once barely discernible fissure, of which I have before spoken as extending from the roof of the building in a zigzag direction to the base. While I gazed this fissure rapidly widened; there came a fierce breath of the whirlwind; the entire orb of the satellite burst at once upon my sight; my brain reeled as I saw the mighty walls rushing asunder; there was a long, tumultuous shouting sound like the voice of a thousand waters, and the deep and dark tarn at my feet closed sullenly and silently over the fragments of the "*House of Usher.*"

Here we may find the power of his poetry. The effect and impression wrought by this luxuriance of imagination is greater than any idea or meaning in it. The poetry of Poe, once we

pass from under the spell and glamour of it, is hollow and meretricious. It is distinctly inferior to his prose, which, I think, will far outlive his verse.

Thus the artist, not to say the artisan, is predominant in Poe. He was a literary artisan of high and strong qualities, amounting to genius in that sort. Realizing the man's nature and limitations, his skill is marvelous, his technique admirable. He was conscious of his gift and was not unnaturally impatient of those who did not recognise its value. His literary sensibilities were so fine as to become a kind of conscience. His art is the art of words. His mind revelled in sounds, in images, in sense-suggestions. His poetry shows the iridescent beauty and also the thinness of a bubble. What he most cared for was not that for which words stand, but the words themselves, their musical and emotional value, their direct and immediate impressiveness.

The positive artistic qualities of Poe's style, therefore, best repay careful study. Briefly, we may indicate them as follows : (a) The nervousness of his style. It is crisp, sharp, keen and yet quiet in the "Tales," dreamy, languorous, gem-like in the "Poems," but in both it is intense. It is the mind at high pressure, spirited and energetic. He threw himself vigorously into the work of composition. The labor was not hurried, but intense. One can realize how such nervous application must have exhausted and prostrated him. His writing is unrelieved by a filling of the ordinary and the commonplace, such as lesser men use. Even when the words are simple and calm, there is intellectual passion behind them. There is little of the nitrogen element in his manner of composition ; it is almost pure oxygen. We feel that he was incapable of any extended work. The tension was too great. But he was master of the straight and simple path to a single powerful sentiment, emotion or idea. Each of his tales moves irresistibly to the concentrated energy of a true climax.

(b) The fastidiousness of his style. Contrary to a general impression, he was never slovenly. His temper was impatient,

but his ear, his sense of propriety and fitness in the use of language was inexorable. The conflict of the two was torture and wore him out with its fierceness. He cared greatly to satisfy himself, and was, in truth, unwearied in polishing and repolishing what he had written. An instinct that is not content with first suggestions, easy solutions, but alters and realters, striving toward the more perfect expression, this is the master key in all art. This distinguishes the artist. Poe does not allow the painstaking to become too apparent. He conceals the effort, but the more you read of his work the more surely it is there. His self-restraint, his literary conscientiousness compelled his fertile imagination to become his slave and servant.

(c) The third high quality in Poe's style is his sense of music and rhythm. This was very keen. No English writer has possessed it in higher degree, unless it be Swinburne. The very titles of his tales and poems are a witness. They were invented and chosen by reason of their liquid spell, their flute-like quality. "Eleonora," "Ulalume," "Lenore." Take such a phrase as "Night's Plutonian shore." It does not mean very much. It will not bear analysis, but the mere concord of syllables is undeniably pleasant; it lingers on the ear; it imprints itself on the mind. English is not in itself a musical tongue, its harmonies have to be sought for. But Poe wrought and fashioned them with skill, by a sure and native instinct. That instinct is not merely for the soft and soothing elements of language. Poe knew how to use the flashlight of vivid, piercing, nerve-tingling words. Like all true musicians, he understood the value of contrasts and discords, the crash and thunder hidden in the vocal sounds of speech. He rated, perhaps too highly, the effect of iteration on the ear, was fascinated by devices of alliteration and refrain.

Poe is not a writer to whom we turn for inspiration. He does not stir or even touch the deeper being of humanity. He has no message to the strenuous life. But he will keep his place, and it seems likely to be a permanent place in English letters.

We do not always care for, we do not always need the seer and the prophet. Sometimes the mind craves the artist's service,

one who can draw us out of ourselves and make us forget our dust and weariness by his dreams and illusions. We demand something vastly different from this too familiar work-a-day world, a world of vague mysteries and shadows, yet not unreal, a world of necromancy whose very strangeness is its power. Here is the answer to that demand. Such was the weird magic of Edgar A. Poe.



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MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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**SECTION F.**

**MINERALOGY AND GEOLOGY.**

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**Officers for 1901.**

SUSY C. FOGG, *President.*

WALTER S. ABBOTT, *Vice President.*

GRACE A. PHILLIPS, *Secretary.*

SARA HUNT, *Treasurer.*

**EXECUTIVE COMMITTEE.**

W. H. HUSE,

E. P. RICHARDSON,

MRS. FRED L. ALLEN.

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## SECTION F.

# MINERALOGY AND GEOLOGY.

### REPORTS OF MEETINGS.

Tuesday evening, January 1, 1901. The President in the chair. After the business meeting, Mr. George I. Hopkins took charge of the mineralogical work for the evening.

Saturday evening, January 19. The President in the chair. The mineralogical work was conducted by Mr. Hopkins. The following resolutions were adopted :

Realizing the great loss which we have sustained during the past year in the removal by death of two of our esteemed members, Lyman W. Colby, who died June 21, and William E. Moore, who died October 22, co-laborers with us in the prosecution of nature studies in which they manifested so much pleasure and delight; the zeal and earnestness with which they always devoted themselves to the work and the interests of Section F; the cheerful and pleasant manner in which they responded so faithfully to any calls to duty; the uprightness of character which they possessed; and the many pleasant recollections we retain of their companionship; we hereby tender our heartfelt sympathy to their families and friends, with whom we sincerely mourn.

|                   |   |            |
|-------------------|---|------------|
| E. P. RICHARDSON, | } | Committee. |
| G. I. HOPKINS,    |   |            |
| S. C. FOGG,       |   |            |

Wednesday evening, January 30. The President in the chair. Mr. Richardson read a paper on "Some Geological Reminiscences of York Beach, Maine."

Wednesday evening, February 27. The President in the chair. At the suggestion of Mr. Hopkins it was unanimously voted to take a trip to Hooksett Pinnacle upon the advent of warm weather. Mr. Huse gave an informal talk on the geolog-

ical and topographical features in the vicinity of York Beach, Maine, illustrated by lantern slides.

Wednesday evening, March 13. The Vice President in the chair. Mr Huse gave a talk on dynamical geology, illustrated by lantern slides.

Wednesday evening, March 27. The President in the chair.

Announcement was made of the opening of the summer school in the near future. Mr. Hopkins took charge of the mineralogical work, after which Mr. Huse gave an illustrated talk on aqueous and igneous agencies in the formation of the earth's crust.

Wednesday evening, April 10. The President in the chair. Announcement was made of the first walk of the geological class of the summer school. The subject of the geological talk was "Organic Agencies."

Wednesday evening, April 24. The subject of the evening was the "Cambrian System."

Wednesday evening, May 8. The President in the chair. The regular mineralogical work was done. The subject for the geological talk was the "Silurian System."

Wednesday evening, May 24. The President in the chair. Mr. James M. Nelson presented the section with a large specimen of chalcopyrite brought him from Capleton, Quebec. Mr. Nelson gave a very interesting description of the mines there and the manner of working them. The subject of the evening's illustrated talk was the "Devonian System."

Wednesday evening, June 5. Mr. Huse was chosen as President for the evening. The subject for the evening was the "Carboniferous Age."

Wednesday evening, October 23. The President in the chair. The recommendation of the Executive Committee that the section take up both mineralogical and geological work was adopted. Mr. Huse talked upon aqueous forces in the world.

Wednesday evening, November 13. The President in the chair. The evening's work consisted of mineral analysis and a talk on igneous forces. Mr. Huse then made the following statements concerning

## TWO LARGE BOWLERS NEAR MANCHESTER.

There are two bowlders near Manchester that are of a size worthy of being recorded, although they are by no means the largest in the State. In the southern part of Dunbarton, not far from the Goffstown line, is one composed of porphyritic gneiss that is thirty-five feet long, thirty-one feet wide, and fifteen feet high above the surface of the ground. How far it extends below the surface is not known. It is located in a swamp, and doubtless rests upon the gravelly bottom of the valley.

The other bowlder is a little larger, being thirty-eight feet long, thirty-five feet wide, and nineteen feet high above the level of the ground. This is situated on the line between Manchester and Londonderry, about forty rods west of the Derry road on the west bank of Manter Brook. It was known to the early settlers as the "Great Rock," and every deed of land in the immediate vicinity named at least one bound as being such a distance in such a direction from the "Great Rock." It is composed of the gneiss that is common in Manchester and other parts of the State. A bank of fine sand, beginning at the bowlder and spreading out like a fan as it extends towards the south shows how the rock divided the current of the post-glacial stream that flowed through the valley.

Wednesday evening, December 11. The President in the chair.

This being the annual meeting, the following officers were elected :

*President*, Susy C. Fogg,  
*Vice President*, Walter S. Abbott,  
*Secretary*, Martha J. Kennedy,  
*Treasurer*, Sara Hunt,  
*Executive Committee*, W. H. Huse, Flora M. Walker, Mrs. Fred L. Allen.

The subject for the evening was "Organic Agencies." Mr. Huse made the following statements about

## SOME GEOLOGICAL FEATURES IN AUBURN.

A short distance north-east of the station of Massabesic is a rocky hill whose steep sides and rocky summit make it a noticeable feature of the landscape. On the north and east the approach to it is gradual. On the west the abruptness is such as to make ascent or descent difficult. From the summit a beautiful view can be obtained of Lake Massabesic, whose island-dotted surface stretches away to the south.

The hill is composed of the gneiss that is common in this vicinity. Upon the summit there are two dikes of light colored igneous rock. An interesting feature of this place is the bending of the strata at the sides of the dikes, which show a fault was made as the strata cracked open. After the split was made, the two edges rubbed together, slightly bending the plastic strata and leaving an interesting feature in the rock for our edification.

A few miles southeast of the above-mentioned hill, and about half a mile south of the picturesque village of Auburn, is another hill whose rounded summit carries a few boulders left by the ice sheet. Through the middle of the gneiss which makes the hill is a stratum of mica schist, somewhat foliated and quite porous. The whole hill is impregnated with iron. Sometime in the past a rending of the earth's crust occurred at this place and the schist gave way, leaving a fissure extending into the hill. The entrance is six or seven feet high and about four feet wide. For a few feet the cave is as wide and high as the entrance. Then, on the left side, a narrow crevice, just wide enough for a man to squeeze through, extends towards the middle of the hill for a distance of sixty-nine feet. About half way in, one can climb up the perpendicular rock at the right and, by crawling through a small passage, come out on the side of the hill eighty-one feet from the entrance. The name, Devil's Den, which has clung to the hole for generations, attests the orthodoxy of the early inhabitants.

The most interesting feature of the cave is a small deposit of stalactitic limonite which coats the roof and the walls. This

shows the different layers very distinctly, and in some places is four inches or more in thickness. There is not enough to be of any commercial value, but is of interest to collectors.



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MANCHESTER INSTITUTE OF ARTS AND SCIENCES.

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**SECTION G.**

**ZOOLOGY.**

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**Officers for 1901.**

EDGAR D. CASS, *President*,  
CHARLES R. DUSTIN, *Vice President*,  
WALTER S. ABBOTT, *Secretary*,  
MILLCENT S. MORSE, *Treasurer*,

**EXECUTIVE COMMITTEE.**

DR. LILLIAN G. BULLOCK,      DR. M. V. B. MORSE,  
MARY F. BARNES.

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## SECTION G.

# ZOOLOGY.

### REPORT OF MEETINGS.

Wednesday evening, October 30, 1901. A meeting was called at the Institute rooms for the purpose of forming a section in zoology. A constitution and by-laws were adopted and the following officers were elected :

*President*—Edgar D. Cass.

*Vice President*—Charles R. Dustin.

*Secretary*—Walter S. Abbott.

*Treasurer*—Millicent S. Morse.

*Executive Committee*—Dr. Lillian G. Bullock, Dr. M. V. B. Morse, Mary F. Barnes.

Thursday evening, November 14. The President in the chair. William H. Huse read the paper appended to this report upon the "Ophidia of New Hampshire." The paper was illustrated by mounted and live specimens.

Thursday evening, December 12. The President in the chair. Edward J. Burnham read the appended paper on "The Red Squirrel; a Study in Variation."

The following officers were elected for 1902 :

*President*—Edgar D. Cass.

*Vice President*—Charles R. Dustin.

*Secretary*—Ellen E. McKean.

*Treasurer*—Millicent S. Morse.

*Executive Committee*—Dr. Lillian G. Bullock, Dr. M. V. B. Morse, Edward J. Burnham.



# The Ophidia of New Hampshire.

BY WILLIAM H. HUSE.

The Ophidia are distinguished from the other reptiles by a cylindrical body, tapering towards the tail, and covered with scales that are attached to the skin so as to allow considerable expansion of the latter. The bones, excepting those enclosing the brain, are attached to each other by ligaments, and can thus accommodate themselves to any expansion of the skin. This occurs whenever anything larger than the snake itself is swallowed. The mouth is usually large. The tongue, which is forked, can be protruded through a small opening in the front of the mouth. This little member is constantly used as a tactile organ to reinforce the defective vision, and has given rise to many a needless fear regarding a snake's power of stinging. The senses of smell and touch are more acute than that of sight. There are no external organs of hearing ; hence that sense cannot be very keen, The sense of taste is probably not very acute, but I do not think it is entirely wanting, as is stated by some, for I have seen a ribbon snake (*T. sauritus*) show unmistakable signs of taste.

The body is covered with scales, which are either smooth or keeled (carinated). These are arranged in all our native species in longitudinal rows on each side of a vertebral row. The under side is covered with one row of transverse band-like scales, called ventral plates or gastrosteges, as far back as the vent. From there to the tip of the tail the plates are arranged in pairs, and are known as sub-caudal plates or urosteges. To each ventral plate a pair of ribs is attached ; hence these plates are of

value in classification. The plates upon the head are named according to their proximity to the lips, mouth, chin or eyes, and are also of use in classifying, as they vary but little in individuals of the same species. The skin is cast whenever the growing body needs a larger coat. I have seen one shed its skin three times in one season in confinement, and have read of its being done four times under the same circumstances. In nature it is probably not cast so often. As the time for shedding the old skin approaches, it becomes dull in color and the eyes assume a milky hue as that portion of the skin over the pupil becomes partially opaque and begins to separate from the eyeball. For a few days the snake is nearly blind. Finally, by rubbing against some rough substance, the skin is peeled back at the lips, and then by crawling between two sticks or stones, or under something, or even through its own coils, the skin is turned wrong side out and is worked off at the tail, when the ophidian appears in new colors, as bright as the proverbial button. This cast-off skin is stretched out considerably longer than the snake that it covered, and so should not be taken as a correct measure of its former occupant.

The progression of serpents is remarkable. The ventral plates may be used to push the animal along in a straight line ; they may be used a side at a time, when the snake moves with an undulatory movement ; or the body may be pushed along by the extension of its muscles, which movement alternates with the pulling of the hind part. No snake can jump. The so-called jumping is only the throwing of the forward portion as far as it will reach from its position when coiled.

The eggs are covered with a leathery envelope which the young snakes rupture by means of an egg-tooth similar to that of a chick. Snakes are both oviparous and viviparous. In the latter the eggs are matured in the parent but are hatched in the oviduct. One curious habit that is ascribed to our water adder (*N. Sipedon*) is that of protecting its young by opening the mouth and allowing them to run in. I was always inclined to doubt the accuracy of the observation of those who professed to

have seen this done until I was informed by the Rev. W. J. Long that he had seen the phenomenon.

A snake's manner of eating is peculiar. With no limbs to aid in seizing or holding its prey, all the work must be done with the jaws. The prey is seized wherever it can be caught, and then the mouth is slowly worked around to one end of the body. Then one side of the mouth is pushed forward and holds on while the other side is advanced. In this way the victim slowly disappears.

All snakes seem to have the power of ejecting an ill smelling fluid when frightened or angry. They do it, however, only under these circumstances. With the exception of the rattlesnake (unless the copperhead is found in the southern portions of the State) our snakes are harmless, shy, graceful, handsome little animals. Many of them do more good than harm. The smallest must live on insects, and thus be entirely beneficial. Yet they suffer more than almost any other animal from the prejudices of humanity.

The order Ophidia is represented in New Hampshire by two families, the Colubridæ and Crotalidæ. These contain the twelve species known to inhabit the State.

### I. Family Colubridæ.

In this family both jaws are provided with small, conical teeth for seizing and holding the prey. There are no poison fangs, hence all are harmless.

#### 1. *Storeria*, Baird and Girard.

1. *S. Occipitomaculata* Storer. Red-bellied Snake. This is one of our smallest snakes, measuring about a foot in length when full grown. The color varies from a light to a dark chestnut brown or even nearly black, sometimes with a paler vertebral band bordered with black dots. There is also on some individuals a row of obscure dots on each side. The most constant features are the salmon-red belly and three light spots, sometimes confluent, just back of the head. The scales are ar-

ranged in fifteen rows. The ventral plates number from 120 to 125.

2. *S. dekayi*, Holbrook. Dekay's Snake. This little snake is about the same size as the preceding, which it somewhat resembles. Like that, it seems to be more abundant in the fall than at other seasons, though why I do not know. This species is of a grayish brown color, with a lighter dorsal stripe bordered by dark lines. The belly is of a grayish color. The scales are in 17 rows; the ventral plates 120 to 138.

## 2. *Thamnophis* Fitzinger.

This genus, the Eutainia of Baird and Girard, includes the garter snakes, which are distinguished by longitudinal stripes. Two species are found in the state. In this vicinity both go by the name of striped snake. Both have carinated scales.

3. *T. sauritus* Linnæus. Riband snake. This is long, slender and very agile. It is usually found about water or low ground, and seldom shows any inclination to fight when captured. The back is black or nearly so, with three bright yellow stripes. Below the lateral stripes the color is brown, shading down to a light yellow on the belly. The rows of scales are 19. The ventral plates number from 150 to 160. The length is about 30 inches.

4. *T. sirtalis* Linnæus. Garter Snake. This species is very variable. The general color is nearly black, varying from olivaceous to brownish. The dorsal stripe of yellow is narrow and usually not so distinct as that of *T. sauritus*. The lateral stripes usually merge more or less into the greenish or brownish yellow of the under side. The colors are generally duller than those of the preceding species, which it resembles. The dark parts are more or less mottled or spotted. In some varieties these spots are more distinct than the stripes. The scales are in 19 rows. The ventral plates number 130 to 160. The maximum length is nearly or quite four feet. This snake frequents higher ground than its relative, though it may and does go to the water for frogs. It is much more pugnacious, often biting

when captured, and occasionally facing an enemy much larger than itself and striking and biting with commendable bravery. Its bite, of course, is harmless.

### 3. *Natrix* Laurenti.

6. *N. sipedon* Linnæus. Water Snake. Water Adder.

The general color is brown or black, divided into large blotches by intersecting spaces of lighter color. The belly is spotted with red and brown, often shading off into a beautiful scale of color. This species attains a length of four feet or more. The scales are in 23 rows; the ventral plates number from 130 to 150. This snake, as its name indicates, frequents water, where it feeds upon fish and frogs. It is a fierce fighter, biting at anything when first captured, but young specimens soon become tame and gentle in confinement and with their various colors make interesting pets.

### 4. *Callopeltis* Bonaparte.

6. *C. obsoletus* Say. Pilot Snake. Black Snake. This, perhaps the largest of our snakes, is dull black with a slate-colored belly. The rows of scales number twenty-seven; the ventral plates 235. The dorsal scales are obscurely keeled. It attains a length of six feet or more.

### 5. *Liopeltis* Fitzinger.

7. *L. vernalis* De Kay. Grass Snake. Green Snake. This beautiful little serpent is of a uniform green above and yellowish below. The scales are in fifteen rows; the plates number from 125 to 140. It rarely, if ever, attains a length of more than two feet.

### 6. *Bascanion* Baird and Girard.

*B. constrictor* Linnæus. Black Snake. Racer. This is a lustrous black, greenish or bluish below. The chin and throat are white. This is probably the black snake that sometimes chases timid people and is reputed to have a white ring about its neck. It is inclined to be savage when cornered or captured. The young are olive or brownish gray with black

blotches. The scales are in 17 rows, rarely 19; the ventral plates number 170 to 190.

### 7. *Diadophis* Baird and Girard.

9. *D. punctatus* Linnæus. Ring-necked Snake. This is blue-black above, pale orange below. Each plate usually has a black dot on each side. The most conspicuous feature is a yellow ring around the neck. It attains a length of a little more than a foot. The scales are in fifteen rows; the ventral plates number 140 to 160.

### 8. *Lampropeltis* Fitzinger.

10. *L. doliatus*, var. *triangulus* Boie. Spotted Adder. House Adder. Milk Snake. This variety of a species which it little resembles in color, is one of our handsomest snakes. With a reputation for venomness which is a slander, it comes about our buildings to catch mice, and is then killed because it is a snake. The color is gray, varying in shade. There are three rows of brown blotches bordered with black, on the upper side. The under side is light gray with square black spots and possesses a pearly lustre that would be admired if it were somewhere else. The extreme length is from three to four feet. The rows of scales are 21; the plates, 180 to 210.

### 9. *Heterodon* Beauvais.

10. *H. platirhinos* Latreille. Puffing Adder, Hissing Adder, Blowing Viper. The foregoing are a few of the many names that are given this snake. It is brownish, with darker blotches, but very variable. Sometimes it is nearly or quite black. The nose is pointed and slightly turned up, somewhat resembling a kernel of buckwheat. When disturbed it makes no attempt to escape but flattens its head and emits a hiss that is rather startling at first. This is another much-maligned snake that has been given a most unenviable reputation. It is, however, perfectly harmless and may be handled with impunity. Its whole appearance and habit of flattening the head and hissing is a good example of protective mimicry. It attains a

length of about 30 inches, has 23 or 25 rows of scales and 120 to 150 ventral plates.

## II. Crotalidæ.

This family includes all the poisonous snakes of the eastern states. The maxillary is furnished with long, erectile fangs, through which the poison is ejected. The body is usually stout. The head is larger than the neck and is triangular. The scales are keeled. All the species are viviparous.

### 10. *Crotalus* Linnæus.

12. *C. horridus* Linnæus. Rattlesnake. This is brown, varying much in shade and more or less blotched. Most of the specimens found in this state seem to be darker than those farther south. The most distinguishing feature is the rattle at the end of the tail. The scales number 23 to 25, the ventral plates 165 to 175. The length is about five feet. This is the only poisonous snake known to live in New Hampshire and it is now nearly extinct in all thickly settled portions.

The foregoing twelve species are all that are known at present to live in the state. There are four more that may possibly be found here. Brief descriptions taken from Jordan's Manual of the Vertebrates are appended.

*Carphophiops amoenus* Say. Ground Snake. Glossy chestnut brown; belly salmon red; head very small; scales 13. Ventral plates 112 to 131. Length 12 inches.

*Regina leberis* Linnæus. Queen Snake. Chestnut brown; a yellow lateral band and three narrow, black dorsal stripes; belly yellow with two brown bands; scales all keeled; scales 19; ventral plates 140 to 150. Length 24. Found about streams.

*Callopeltis vulpinus* Baird and Girard. Fox Snake. Light brown, with quadrate, chocolate colored blotches. Scales 25. Ventral plates 200 to 210. Length 60 inches.

*Agkistrodon contortrix* Linnæus. Copperhead. Hazel brown; top of head coppery red; back with a series of 15 to 25 V-shaped blotches; belly yellowish, with 35 to 45 dark spots on each side. Scales 53. Ventral plates 150 to 155. Length 40 inches.



## Our Two Forms of Red Squirrel.

BY EDWARD J. BURNHAM.

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The typical red squirrel, *Sciurus hudsonicus* Erxleben, is about 14 inches in length, the tail being a little less than one-half of the whole. It is yellowish gray, with a median wash of bright rusty red along the back. The tail is marked by a narrow sub-terminal band of black. The under parts of the body are white, vermiculated with black, the black being most distinct in late autumn and winter.

While this is the typical *Sciurus hudsonicus*, abundant northward, it is rare in southern New Hampshire. The red squirrel which abounds along the shores of our rivers and lakes and in the woods on the hillsides is somewhat larger than the northern form; its back is more rusty; its sides are less olive; it lacks the black band near the tip of the tail, and its under parts are pure white. It was classed as a sub-species by Bangs, the sub-specific designation, *loquax*—Latin for loquacious—being sufficiently suggestive to any one familiar with its habits.

Jordan states that the sub-species *loquax* extends north to Maine and Minnesota, being common southward; while *S. hudsonicus* is found in mountains as far south as North Carolina, and is common northward. Mr. George E. Burnham has secured one specimen of the northern form on Joe English, in New Boston (height 1100 feet), and has observed several individuals on the Uncanoonucs, in Goffstown (height 1300 feet). They have been reported from McCoy's and Fort Mountains, in

Epsom, Merrimack County (height 1590 feet), and Mr. W. D. Davis has obtained specimens in Sutton, Merrimack County, the exact locality being undetermined and the altitude in consequence unknown. At Plymouth, in Grafton County, the northern form is reported to be more abundant than the southern, even in the valleys. In Crawford's Notch, in the White Mountains, in the summer of 1900, George E. Burnham found the northern form alone.

The history and relationship of these two forms of red squirrel are of special interest as illustrating the influence of altitude upon the geographic distribution of life in North America. Naturalists were early led to attempt to divide the surface of the land into faunal and floral regions or zones. Dr. C. Hart Merriam has shown, in his paper on "The Geographic Distribution of Life in North America," (Smithsonian Report for 1901), that no fewer than fifty-six authors have proposed such divisions for this continent. The earlier writers defined their regions chiefly by lines of latitude, but it was soon perceived that some account must also be taken of elevation.

In 1863, Prof. A. E. Verrill (Proceedings Essex Institute, III, 138), basing his conclusions upon observation of the birds in the breeding season, asserted that "The Adirondack region of New York, the northern parts of Vermont and New Hampshire, including most of the higher parts of the Green Mountains and all of the White Mountains, and even the summit of the higher Alleghanies, will be included in the Canadian fauna." This was equivalent to declaring that the Canadian or Boreal zone extends, by a chain of mountain tops or islands of cold, as far south as North Carolina.

Ten years later, Samuel H. Scudder, in his paper on "The Distribution of Insects in New Hampshire" (Geology of New Hampshire, I, 333), observed that "The northernmost Alleghanian and southernmost Canadian species gradually decrease in numbers away from their metropolis, and become confined to increasingly lower or higher altitudes \* \* according as they are Alleghanian or Canadian forms."

Dr. Merriam, in the paper already cited, says of the Boreal

region that it "gives off three long arms or chains of islands, which reach far south along three great mountain systems of the United States—an eastern arm in the Alleghanies, a central arm in the Rocky Mountains, and a western arm in the Cascades and Sierra Nevada." It is with the first of these that we have to do in this paper.

In his study of the distribution of animals in America, Dr. Merriam found that of the 130 genera of non-pelagic mammals inhabiting North America north of Panama, there are only six genera each of which ranges over large parts of both Boreal and Sonoran regions, including, of course, the transition zone between. They are *Sciuropterus*, *Sciurus*, *Spermophilus*, *Lepus*, *Canis*, and *Lutra*. These genera—comprising the squirrels, the rabbits, the wolves, and the otters—are all of great antiquity, the remains of most of them having been found as low down as the Miocene. They were early diffused over the continent, and their peculiar habits of life, although so dissimilar, enabled them to survive the great mutations of these land areas since Miocene times.

It is well established that during the Glacial Epoch many genera formerly represented in North America perished utterly. But upon the advance of the great ice sheet and its attendant cold, the wolves, the rabbits and the otters retreated southward, and with them went the squirrels to find new homes in the tropics, somewhat over-crowded, doubtless, but able to adapt themselves to their new surroundings and bide their time.

When the ice began its final retreat, and vegetation slowly reasserted its dominion, a few of the hardier and more adventurous of the squirrels pushed their way along the sea coast and up the river valleys. Among these were they of the vermiculated bellies and the black band near the tip of the tail. They multiplied, spread over the land, and undoubtedly had things much their own way for a time—perhaps for many centuries. Then a horde of their cousins began to press on from behind. These new-comers were less showy in their rusty-red coats, but they were larger, more noisy, and more aggressive. The effect was similar to that of the Teutonic invasion upon the Celts.

The earlier inhabitants were driven farther northward, or betook themselves to the mountains, while the invaders occupied the lowlands, where they remain to this day, and where they must remain for many centuries, perhaps for many thousands of years, to come. For, with the recurrence of each season of reproduction, the cold of the higher levels and of the more northern latitudes sets a bound beyond which they cannot hope to rear their young.

## REPORT OF THE CURATOR.

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There are at present in the museum of the Institute the following specimens :

|  |      |
|--|------|
| Minerals .....   | 207  |
| Plants, pressed and mounted in the herbarium .....                     | 422  |
| (In addition to these there are several hundred un-mounted specimens.) |      |
| Insects.....   | 1098 |
| Other Invertebrates .....  | 192  |
| Fish .....   | 13   |
| Batrachians .....  | 10   |
| Reptiles.....  | 43   |
| Birds .....  | 157  |
| Birds' Nests.....  | 30   |
| “ Eggs, species.....   | 77   |
| Mammals .....  | 27   |
| Skulls of Vertebrates.....   | 28   |
| Casts .....  | 116  |
| Pictures and other works of art, exclusive of casts .....              | 141  |
| Antiquities (furniture, tools, weapons, etc.) .....                    | 128  |

Of Indian relics, chiefly arrow and spear points, with some stone axes, mostly found about Manchester, there are several hundred.

In addition to these, there are a number of curios, unnumbered and unclassified.

W. H. HUSE, *Curator*.



## SUMMER SCHOOL.

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The second season of the Summer School of the Institute began on April 6. The following announcement on a folder giving a calendar of the spring and summer work brought to the classes enthusiastic workers whose researches meant much for the scientific knowledge of the vicinity :

"The Summer School, inaugurated last year under the auspices of the Institute, was admittedly an experiment, made in the hope of securing to the members the advantages of systematic and united effort in certain clearly defined branches of nature study. The result was so gratifying that there was no hesitation in arranging for a Summer School for the present season on the same general plan, with the few modifications which experience suggested as desirable.

Such interest has been shown in the study of Vertebrate Zoology at the Institute during the past year, that it has been deemed best to extend the scope of the work which was last year undertaken by the class in Entomology. This class, in the broader field of Zoology, will attempt to make some study of wild animal life, in whatever form it may be found, in pond and stream, and field and forest—exclusive of the birds, which will, of course, be left as the special field of the class in Ornithology.

For the present the school will comprise three departments—Zoology, Ornithology, and Mineralogy and Geology. A class in Botany and Mycology will probably be added later, with special reference to the study of mushrooms and the late flora. There will be practical demonstration in field work, under competent instructors, for each class, on alternate Saturdays,

supplemented by studies and lectures at the regular evening meetings at the Institute rooms."

The organization was as follows :

*Principal.*

WILLIAM H. HUSE.

*Instructors.*

Zoology—EDWARD J. BURNHAM.

Ornithology—FREDERICK W. BATCHELDER.

Mineralogy and Geology—GEORGE I. HOPKINS.

Mr. Batchelder had as assistants Misses Theodora Richardson and Isabelle R. Daniels and Edgar D. Cass. Mr. Hopkins was unable to take up the work with the class in mineralogy and geology, and his place was taken by the principal.

The class in Zoology failed to make proper arrangements with the Weather Bureau and so was prevented from doing as much work as it wished in the study of outdoor animal life. On the fair days, however, much enthusiastic work was done.

The class in Ornithology was likewise hindered by poor weather, but made interesting trips to Oak Hill, Stark Park, Lake Massabesic and Hooksett Pinnacle. The largest number of species seen on any one trip was thirty-one, in the vicinity of Stark Park on May 25.

The Geological class was more fortunate than the others, for even if the day were cold and raw or the sky overspread with clouds, the specimens it sought were just as abundant and numerous as on fairer days. On April 13 the class visited the kames in West Manchester that lie on both sides and nearly parallel with the Piscataquog river. In connection with these the large, nearly circular basin just west of McGregorville was of peculiar interest.

On April 27 the class visited East Manchester and there studied a moraine that is fast being carted away for streets. Here is found till, scratched and polished bowlders and debris of all kinds, that was brought down from the north during the glacial period.

The trip on May 11 was to Auburn partly in connection with the class in ornithology. The rocky hill northeast of the railroad station at Massabesic was climbed and found to be well worth the climb. Some peculiar examples of curved strata were seen and studied for the first time.

On May 25 an invitation from Mr. Ervine E. Brock to visit and inspect his collection was accepted and a delightful afternoon was spent. Mr. Brock, who spent several years in the West, had collected a large number of minerals and entertained his visitors with descriptions of his specimens, mostly ores, and the mode of mining and smelting.

Hooksett Pinnacle was visited on June 8. Here is a rocky prominence of milky quartz, situated on one side of the Merrimack Valley. The vein of which this is a part extends from the Pinnacle in a northeasterly direction across the river, forming the rapids at that point, cropping out once in the middle of the stream and reappearing occasionally on the hills to the east. Here are found quartz crystals in abundance although the larger crystals have been taken away. In one crevice some fine pseudomorphs of quartz after calcite have been found. A good specimen of the latter was donated to the Institute museum in 1900, by Mr. Bela H. Emerson, of Hooksett. The formation of a sandy island in the river as a result of the building of the dam at Hooksett Falls is a piece of geological work of recent years.

On June 22 carriages were taken for a drive through portions of Londonderry and Auburn. The large boulder, the largest near Manchester, situated on the line between Manchester and Londonderry, was visited and inspected. From there the class drove to a white quartz ledge near the line between Londonderry and Auburn, coming back by way of Rattlesnake Hill, seeing some good examples of glacial polishing and scratching on a ledge near the outlet of Lake Massabesic.



## CHANDLER LECTURE COURSE.

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Through the continued generosity of Hon. George Byron Chandler the following course of lectures was tendered to the members of the Institute for the season of 1901-1902 :

Tuesday, November 12, 1901. THE SULTAN'S CAPITOL, (Illustrated) by PROF. HENRY TURNER BAILEY, Supervisor of Art Instruction in the Public Schools of Massachusetts.

Tuesday, December 3, 1901. THE PLANT WORLD AND ITS SOCIAL RELATIONSHIPS—A STUDY IN ECOLOGY (Illustrated), by LIBERTY H. BAILEY, Professor of General and Experimental Horticulture at Cornell University.

Friday, January 3, 1902. THE NEEDS OF A MODERN PUBLIC LIBRARY, by MR. HILLER C. WELLMAN, Librarian of the Brookline, Mass., Public Library.

Wednesday, February 5, 1902. ART AND MANUAL TRAINING IN EDUCATION, (Illustrated) by PROF. J. LIBERTY TADD, Director of the Public School of Industrial Art of Philadelphia.

Wednesday, March 5, 1902. BIRDS WITH A CAMERA, (Illustrated) by PROF. FRANK M. CHAPMAN, Curator of the Ornithological Department of the American Museum of Natural History, New York City.

Wednesday, April 2, 1902. THE EVIDENCES OF A FUTURE LIFE, by JAMES H. HYSLOP, Professor of Psychology in Columbia University.

1. The first part of the document is a list of the names of the persons who have been appointed to the various offices of the city of New York.

2. The second part of the document is a list of the names of the persons who have been appointed to the various offices of the city of New York.

3. The third part of the document is a list of the names of the persons who have been appointed to the various offices of the city of New York.

4. The fourth part of the document is a list of the names of the persons who have been appointed to the various offices of the city of New York.

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11. The eleventh part of the document is a list of the names of the persons who have been appointed to the various offices of the city of New York.

## DONATIONS.

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The following comprises the donations to the Institute during the year 1901 :

### BIRDS.

- Uria lomvia* (Brunnich's Murre) unmounted, found in East Manchester Dec. 21, 1900 alive but which died four days later; Fred A. Lovering.
- Crotophaga pileatus* (pileated Woodpecker); William E. Moore.
- Mergus americanus* (Merganser); C. W. Taintor, Schenectady, N. Y.
- Accipiter cooperi* (Cooper's Hawk); *Buteo lineatus* (Red Shouldered Hawk); *Circus hudsonius* (Marsh Hawk); *Perisoreus canadensis* (Canada Jay); *Zonotrichia leucophrys* (White-Crowned Sparrow); John L. McQuesten.
- Fulica americana* (Coot); Ervine E. Brock.
- Pandion haliaetus carolinensis* (Osprey); Harold Leavitt.
- Lophodytes cucullatus* (Hooded Merganser); George Hosser. (Hawk); George V. Hill.
- Charitonetta albeola* (Bufflehead); William H. Huse.
- Corvus americanus* (Crow); Unknown.
- Aix sponsa* (Wood Duck) m and f; *Clangula clangula americana* (Golden Eye) m and f; *Bonasa umbellus* (Ruffed Grouse) m and f; *Accipiter cooperi* (Cooper's Hawk) adult f and young m; *Accipiter atricapillus* (Goshawk) adult and young m; *Buteo borealis* (Red Tailed Hawk); *Buteo latissimus* (Broad Winged Hawk) adult and young m; *Asio wilsonianus* (Long Eared Owl); *Nyctala acadica* (Saw-whet Owl); *Megascops asio* (Screech Owl); *Bubo virginianus* (Great Horned Owl); *Chaetura pelagica* (Chimney Swift); *Empidonax flaviventris* (Yellow-bellied Flycatcher); *Empidonax traillii* (Traill's Flycatcher); *Empi-*

*donax minimus* (Least Flycatcher); *Corvus americanus* (Crow) m and f; *Aglaius phœniceus* (Red-winged Blackbird) m and f; *Scolecophagus carolinus* (Rusty Grackle) m and f; *Carpodacus purpureus* (Purple Finch) m and f; *Loxia leucoptera* (White-winged Crossbill) m and f; *Loxia curvirostra minor* (Red Crossbill) m and f; *Acanthus linaria* (Red Poll); *Spinus tristis* (Goldfinch) m and f; *Spinus pinus* (Pine Siskin); *Plebsphenax nivalis* (Snow Bunting) m and f; *Zonotrichia leucophrys* (White-crowned Sparrow) adult and young m; *Spizella monticola* (Tree Sparrow); *Spizella socialis* (Chipping Sparrow); *Spizella pusilla* (Field Sparrow); *Junco hyemalis* (Junco); *Melospiza fasciata* (Song Sparrow); *Melospiza georgiana* (Swamp Sparrow); *Melospiza lincolni* (Lincoln's Sparrow); *Zamelodia ludoviciana* (Rose-breasted Grosbeak) m and f; *Petrochelidon lunifrons* (Eave Swallow); *Chelidon erythrogaster* (Barn Swallow); *Tachycineta bicolor* (Tree Swallow); *Clivicola riparia* (Bank Swallow); *Ampelis Cedrorum* (Cedar Bird) m and f; *Lanius borealis* (Great Northern Shrike); *Vireo olivaceus* (Red-eyed Vireo); *Vireo solitarius* (Solitary Vireo); *Mniotilta varia* (Black and White Creeper) m and f; *Helminthophila rubricapilla* (Nashville Warbler); *Compsothlypis americana usneæ* (Parula Warbler); *Dendroica cærulescens* (Black-throated) Warbler m and f; *Dendroica coronata* (Myrtle Warbler); *Dendroica maculosa* (Magnolia Warbler); *Dendroica castanea* (Bay-breasted Warbler) m and f; *Dendroica striata* (Black-poll Warbler); *Dendroica blackburniæ* (Blackburnian Warbler) m and f; *Dendroica vigorsii* (Pine Warbler); *Seiurus auracapillus* (Golden-crowned Thrush); *Seiurus noveboracensis* (Water Thrush); *Geothlypis agilis* (Connecticut Warbler); *Geothlypis trichas* (Maryland Yellow-throat) m and f; *Regulus calendula* (Ruby-crowned Kinglet); *Regulus satrapa* (Golden-crowned Kinglet); *Turdus fuscescens* (Veery); *Turdus ustulatus swainsonii* (Olive-backed Thrush); *Turdus aonalaschkæ pallasii* (Hermit Thrush); *Merula migratoria* (Robin); *Sialia sialis* (Bluebird) m and f. Mrs. Susan J. Olzendam, as a memorial to her daughter, Miss Sidonia C. Olzendam.

#### ANIMALS.

*Fibre zibethicus* (Muskrat); Samuel J. Laflamme.  
*Putorius noveboracensis* (Weasel); John K. McQuesten.  
*Ursus americanus* (Brown Bear) Cub; Harrie M. Young.

Embryo of *Bos taurus*; William K. Robbins.  
*Phoca vitulina* (Harbor Seal); Edward Weber.

## INSECTS.

Collection embracing 114 Coleoptera, 51 Hymenoptera, 11 Diptera, 23 Hemiptera and 20 miscellaneous insects; Walter S. Abbott.

Ova of *Chrysopa*; E. J. Burnham.

Sphinx Moths from Colorado; Harry M. Quimby.

*Diapheromera femorata* Walking Stick; Miss Emma J. Jeffers.

## FLOWERS.

Collection embracing the flora of Mt. Washington, collected by W. S. Jewell while in charge of the signal station at the summit; Captain David Perkins.

## MINERALS.

Specimen of amethyst; Mrs. Lyman W. Colby.

Sylvanite from Bonanza King mine, Cripple Creek, Colo.; W. B. Boardman, Colorado Springs.

Brazilian agate; George Hosser.

Rock showing contortions of strata, found in the gravel bank on Rochelle avenue; Ervine E. Brock.

Copper pyrites from Capelton, Quebec; James M. Nelson.

Collection of minerals; Frank M. Forsaith.

Sand from shore of Great Salt Lake, gravel from Garden of the Gods; Isaac Huse, Jr.

Eroded rock; George Emerson.

Collection of minerals; Dr. Lillian G. Bullock.

Roxbury pudding stone, sandstone from Niagara Falls; Miss Millicent S. Morse.

Minerals; Miss Ella M. Dowst.

Sphalerite, apatite, series showing formation of soil from rock, and series showing formation of sand from rock; specimens illustrating formation of soil from rock; series of specimens illustrating the formation of coal; William H. Huse.

Weathered and eroded rocks; Miss Linda Hunter Moor.

Eroded boulder; Edward Weber.

## INDIAN IMPLEMENTS.

Indian arrow chips; Clarence H. Knowles.

Case and collection of Indian relics, minerals and antiquities collected by the late Charles S. Kidder; Mrs. Emma S. Kidder.

## BIOLOGY.

Double-siphoned salt water clam ; Harrie M. Young.

Coquina, from Florida ; Mrs. Melusina H. Varick.

Millipede ; E. J. Burnham.

*Clypeasta rogersi* (sand plate) ; echinoid (sea urchin) natural form ; internal shell ; part of spines removed, showing shell, also bony structure of body, procured at York Beach ; E. P. Richardson.

Coral dredged at Portsmouth, probably brought over in a vessel as ballast. Supposed to be *Favosites nidgarensis* ; William E. Moore.

*Rana sylvatica* (Wood Frog) ; Pauline Huse.

*Thamnophis sauritus* (Riband Snake) ; Raymond W. Huse.

*Heterodon platirhinus* (Puffing Adder) ; *Diadophis punctatus* (Ring-necked Snake) ; *Storeria dekayi* (DeKay's Snake) ; *Rana catesbiana* (Bull Frog) ; *Rana clamitans* (Green Frog) ; *Rana palustris* (Pickerel Frog) ; William H. Huse.

*Alligator mississippiensis* (Alligator) ; Edward Weber.

*Ameiurus nebulosus* (Horned Pout) ; *Semotilus bullaris* (Roach) ; *Diemyctylus viridescens* (Newt) ; *Micropterus dolimieu* (Small-mouthed Black Bass) *Lepomis gibbosus* (Bream) ; *Perca flavescens* (Yellow Perch) ; *Liopeltis vernalis* (Grass Snake) ; *Thamnophis sirtalis* (Garter Snake) ; one-legged frog, unclassified ; *Diemyctylus viridescens miniatus* (Red Eft) ; Walter S. Abbott.

## WOODS.

Wood of *Xanthoxylon clava-herculis* (Prickly Ash) ; George H. Hosser.

Petrified Wood ; Mrs. John C. Bickford.

## BIRDS' EGGS.

Eggs of 72 species of birds ; Harrie M. Young.

Eggs of *Seiurus aurocapillus* (Oven Bird) ; John K. McQuesten.

## NESTS.

*Agelaius phoeniceus* (Red-winged Blackbird) ; *Zamelodia ludoviciana* (Rose-breasted Grosbeak) ; *Passerina cyanea* (Indigo Bird) ; William H. Huse.

*Turdus fuscescens* (Veery) ; *Merula migratoria* (Robin) ; *Galeoscoptes carolinensis* (Cat Bird) ; *Melospiza fasciata* (Song Sparrow) ; *Tyrannus tyrannus* (King Bird) ; Sayornis

phœbe (Phœbe); *Empidonax minimus* (Chebec); *Icterus galbula* (Golden Robin); Raymond W. Huse.  
*Merula migratoria* (Robin) decorated; Miss Bertha L. Kemp.  
*Seiurus aurocapillus* (Oven Bird); *Trochilus colubris* (Ruby-throated Humming Bird); *Sayornis phœbe* (Phœbe), built on a clothesline; James O. Harriman.  
*Vespa maculata* (White-tailed Hornet); William Clark, Londonderry.  
 Various birds' nests; Miss Ella M. Dowst and Miss May W. Davis.

## TURTLES.

Mounted specimens of *Chelydra serpentina* (Snapping Turtle); *Clemmys insculptus* (Wood Turtle); shell, two skulls and mounted specimen of *Emydoidea blandingi* (Blandings' Box Turtle); William H. Huse.

## ART.

Bas reliefs of Bryant, Garibaldi, Whittier and Raphael; William H. Huse.  
 Two framed pictures and collection of small pictures, woven in silk; George Hosser.  
 Priming wire; fireplace, frame and fixtures; Dutch oven; flax hatchel; warming pan, sausage filler; foot stove; oven shovel; bellows; two flax beetles; candle mold; two iron pots; skillet; sickle; curd tongs; hand-made pewter platter 115 years old; hand-forged hatchet; rafting oar; flax reel; pitchfork; gridiron; two wool cards; two pairs spectacles; Colt's revolver; candlestick; auger gimlet; bread shovel; John K. McQuesten.  
 Up and down saw from the old Farmer mill at the mouth of Black Brook; George A. Farmer.  
 Loading spoon; Harrie M. Young.  
 Three worsted combs; two pewter platters; George Emerson.  
 Old documents; George Hosser.  
 Cook stove made in 18th century; Henry B. Fairbanks.  
 Collection of ancient tools; Charles D. Taffe.  
 Glass bottle over 100 years old; William H. Huse.

## BOOKS, PAMPHLETS AND MAGAZINES—DEPARTMENT REPORTS.

Five pamphlets on mushrooms, Department of Agriculture; Walter S. Abbott.

Report of Bureau of Education for 1898-1899, 2 volumes ; William H. Huse.

Five volumes annual reports, Bureau of Ethnology ; 6 circulars and 9 bulletins, Department of Agriculture ; 5 pamphlets and 5 reports, U. S. Bureau of Ordnance ; 3 volumes 1897-98-99, U. S. Coast and Geodetic Survey ; U. S. Department Reports, pamphlets and bound volumes ; Hon. Henry E. Burnham.

#### STATE REPORTS.

Report of Railroad Commissioners for 1900 ; Railroad Commissioners.

Report of Railroad Commissioners for 1899 ; Report of Labor Commissioners for 1897-98 ; Henri Schæffer.

New Hampshire Manual of the General Court, 1901 ; William H. Huse.

Adjutant General's Report, 1865, Vols. 1-2 ; J. Brodie Smith.

#### SCIENTIFIC AND TECHNICAL.

Manual of Vertebrates, Jordan ; William H. Huse.

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